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WAYNE G. BRANDSTADT, *Colonel, MC, U. S. A., Editor-in-Chief*
ROBERT J. BENFORD, *Colonel, U. S. A. F. (MC), Associate Editor*
WILLIAM R. WHITEFORD, *Captain, MC. U. S. N., Associate Editor*

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Foreword

The UNITED STATES ARMED FORCES MEDICAL JOURNAL represents the unification of the BULLETIN OF THE UNITED STATES ARMY MEDICAL DEPARTMENT and the UNITED STATES NAVAL MEDICAL BULLETIN. This joint periodical is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense.

The Chairman of the Armed Forces Medical Policy Council and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this JOURNAL.

W. RANDOLPH LOVELACE, II, M. D.,
Chairman, Armed Forces
Medical Policy Council,
Department of Defense.

GEORGE E. ARMSTRONG,
Major General, U. S. A.,
Surgeon General, U. S. Army.

LAMONT PUGH,
Rear Admiral, MC, U. S. N.,
Surgeon General, U. S. Navy.

HARRY G. ARMSTRONG,
Major General, U. S. A. F.,
Surgeon General, U. S. Air Force.

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OFFICE OF THE SECRETARY OF DEFENSE
ARMED FORCES MEDICAL POLICY COUNCIL
WASHINGTON 25, D.C.

MEMO: Personnel of the Medical Services of the United States Armed Forces

Completion of an around-the-world survey of Army, Navy, and Air Force medical and research installations with Dr. C. W. Mayo provided us with conclusive evidence of the unity of effort and the interservice coordination of the Medical Services in all theaters. The great value of specialized research at overseas installations on problems applicable to military medicine was clearly evident. The use of scientific attachés, as in Great Britain and Sweden, and such installations as the Naval Medical Research Unit No. 3 in Cairo, are extremely worthwhile.

While visiting in Korea and Japan, during which time Dr. Leonard Scheele, Surgeon General, U. S. Public Health Service, was a member of the group, we found that the medical and surgical program of the three medical services and the evacuation chain had been developed so well that even the high standards of medical care of World War II have been excelled. The traditional heroism of company aid men in bringing out the wounded has contributed materially to this fine record of medical care as in the past. The splendid work of the battalion surgeons and the physicians in the mobile army surgical hospitals has proved the efficacy and wisdom of the postwar graduate training program.

As in the later phases of World War II, the interval of time before a casualty receives definitive care has been markedly reduced by air evacuation. In addition, front-line evacuation by helicopter is now an effective part of the chain of evacuation. It is limited to situations where there is clear air superiority. Air evacuation can now be made to the zone of the interior from any military installation in the world. The U. S. S. Repose and U. S. S. Haven have provided splendid floating hospitals and have been most helpful in the care of many casualties. The use of civilian and service consultants is both popular and worthwhile.

We were favorably impressed by the fact that military commanders in the field, from General Ridgway on down to the company commanders, expressed intense interest and pride in the effectiveness of the medical care being provided their men. The medical aid of our Allies in the United Nations is also excellent.

Although not widely appreciated, the success of the preventive medicine program is shown by the low incidence of disease in U. N. forces in Korea and in other overseas areas where many serious diseases are endemic and often epidemic. But for this program, diseases among U. N. personnel could well have caused more casualties than combat. Lieutenant Colonel L. C. Kossuth, USAF (MC), accompanied us in the Middle East, where there are numerous epidemiologic problems.

From now on increased emphasis will be placed on the development of lightweight airborne hospital equipment, improved surgical instruments, standardization of the best items of improvised field equipment, research on the treatment of arterial wounds, increased use of field research teams, improvement and simplification of medical records, and the publication of a text on war wounds.

W. Randolph Lovelace, II, M. D.
Chairman

Blood Vessel Bank[1]

Francis N. Cooke, *Lieutenant Colonel, MC, U. S. A.*
Dwight M. Kuhns, *Colonel, MC, U. S. A.*
John T. Elston, *Major, MC, U. S. A.*
Slater M. Dozier, *Major, MC, U. S. A.*
Matthew H. Fusillo

AN ARTERIAL graft bank was established at this hospital in August 1949 following the principles of blood vessel preservation as outlined by Gross et al. (2). The bank was initially used for animal experimentation. Later, human blood vessels were banked at frequent intervals. The purpose of the bank was to have available homologous grafts which could be used to bridge aortic defects resulting from the removal of unusually long coarcted segments (2,3). The large number of vascular injuries resulting from the Korean war, in which large arterial defects made impossible the establishment of normal or near normal blood flow, stimulated us to use preserved homologous grafts in some cases. The use of blood vessel banks has been found practical for civilian institutions (4). A plan of operation which has proved successful in this institution is presented. The information on which this operational procedure is based has been compiled from many sources (2,4-12).

(1) Walter Reed Army Hospital, Washington, D. C.

(2) Gross, R. E.; Bill, A. H., Jr., and Peirce, E. C. II: Methods of preservation and transplantation of arterial grafts. Surg., Gynec. & Obst. 88: 689, June 1949.

(3) Beattie, E. J., Jr.; Cooke, F. N.; Paul, J. S.; and Orbison, J. A.: Coarctation of aorta at level of diaphragm treated successfully with preserved human blood vessel graft. J. Thoracic Surg. 21: 506-512, May 5, 1951.

(4) Keefer, E. B. C.; Andrus, W. DeW.; Glenn, F.; Humphreys, G. H., II; Lord, J. W., Jr.; Murphy, W. B.; and Touroff, A. S. W.: Blood vessel bank. J. A. M. A. 145: 888-893, Mar. 24, 1951.

(5) Gross, R. E.; Hurwitt, E. S.; Bill, A. H., Jr.; and Peirce, E. C., II: Preliminary observations on use of human arterial grafts in treatment of certain cardiovascular defects. New England J. Med. 239: 578-579, Oct. 14, 1948.

(6) Carrel, A.: Heterotransplantation of blood vessels preserved in cold storage. J. Exper. Med. 9: 226, 1907.

(7) Peirce, E. C., II; Gross, R. E.; Bill, A. H., Jr.; Merrill, K., Jr.: Tissue culture evaluation of blood vessels stored by refrigeration. Ann. Surg. 126: 333, Mar. 1949.

(8) Deterling, R. A., Jr.; Coleman, C. C., Jr.; and Parshley, M.: Preliminary report on experimental studies of frozen homologous aortic grafts. New York Med. 6: 19-20, July 5, 1950.

(9) Gross, R. E., and Peirce, E. C., II: Personal communication to Major J. T. Elston.

(10) Parker, R. C.: Methods of Tissue Culture, 2d edition, Paul B. Hoeber, Inc., New York, N. Y., 1950.

PROCUREMENT OF MATERIAL FOR GRAFTS

The tissue used for grafts consists of segments of aorta, carotid, subclavian, and iliac arteries. These vessels are removed from the bodies of young persons within 4 hours after death. Death must have been unassociated with malignancy, leukemia, infectious diseases (viral, rickettsial, bacterial, spirochetal, or mycotic) or degenerative diseases such as periarteritis nodosa, arteriosclerosis, or disseminated lupus erythematosus. The major source of vessels is from cases of traumatic death.

The vessels are obtained in the operating room using strict aseptic technics as soon as permission for autopsy has been received. The usual Y-shaped autopsy incision is employed and the vessels are removed by approaching them laterally and posteriorly. The method is that employed in the first portion of the Rokitansky block technic for removing organs at autopsy. This procedure does not distort the organs, or in any way interfere with the work of the pathologist who later performs the autopsy. Prior to removing the vessels, blood is removed the heart for blood culture and serologic tests for syphilis if the latter has not been recently accomplished. The vessels are cut into segments about 3 inches in length and extraneous tissue such as fat is removed from them. In the cases thus far encountered, longer segments have not been needed. If longer grafts were contemplated, they could easily be taken but taller storage bottles than those now used would be necessary.

The vessel segments are stored in 250-ml. bottles of the type used for blood storage (fig. 1). These bottles are filled to the 200-ml. mark with preservative fluid, the composition and preparation of which will be described below. The bottles are closed with a rubber stopper and a separately wrapped sterile rubber stopper accompanies each bottle. The surgeon, after cutting the vessels to the desired length, places a silk suture in one end of the vessel and sews the other end of the suture to the bottom of the second rubber stopper, allowing about 3 inches of thread between the vessel and the stopper (fig. 2). The stopper is removed from the storage bottle and the vessel segment is lowered into the bottle. When the rubber stopper is in place, the vessel segment will be completely suspended with all portions bathed by fluid (fig. 3). This method also prevents damage to the vessel from bending. Before leaving the operating room, all bottles are labeled as to autopsy number, date of acquisition, and length of time after death. The label also has space for results of tissue culture, bacteriologic culture, antibiotic assay and other chemical studies or comments.

(11) Cameron, G.: Tissue Culture Technique. 2d edition. Academic Press, Inc., New York, N. Y., 1950.
(12) Cornman, I.: Personal communication.

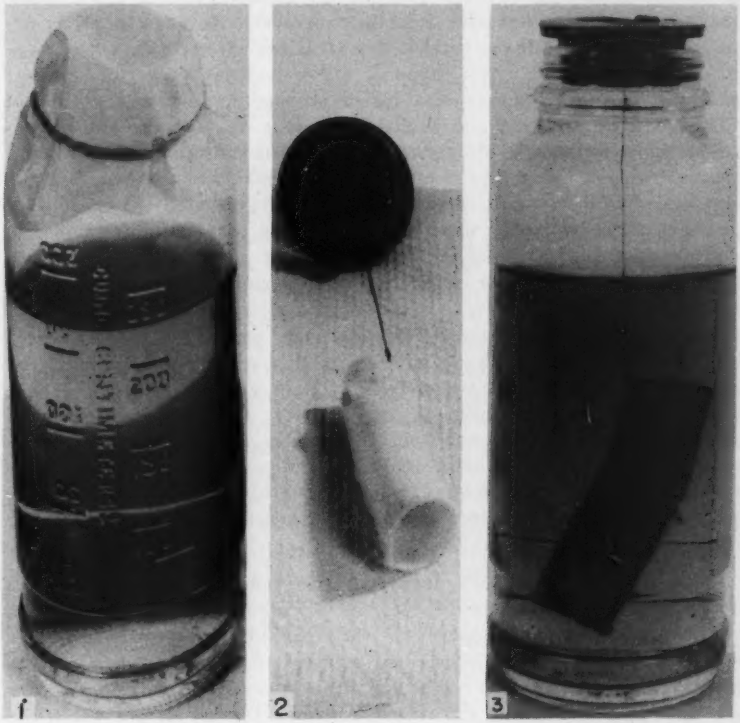

Figure 1. Vessel storage bottle. Figure 2. Vessel segment attached to stopper. Figure 3. Storage bottle containing arterial segment.

STORAGE AND ISSUE OF VESSELS FOR GRAFTS

As soon as the bottles are labeled in the operating room, they are carried to the blood vessel bank. There each bottle is given an acquisition number and all of the data on the label is recorded. The bottles are then placed in a thermostatically controlled refrigerator of the blood-bank type. The temperature in this refrigerator is maintained at 4°C. A mechanical recording device which is a part of the refrigerator maintains a graphic record of the temperature at all times. Bacterial cultures for anaerobic and aerobic bacteria employing penicillinase are conducted at the time the vessels are received and at 7-day intervals thereafter. All cultures are observed for 72 hours. Careful surveillance for mycotic contaminants should be maintained at all times (9). The fluid for culture is easily obtained by inserting a spinal needle through the rubber stopper after cleansing the stopper thoroughly and removing with a sterile sponge any toxic material used in the

cleansing process. Antibiotic assay is performed at the time of bacterial culture beginning with the seventh day of storage. The color of the indicator in the preservative fluid is observed daily and the pH is adjusted if indicated. If the fluid is too alkaline, filtered CO_2 will adjust it. If it is too acid, a few drops of buffer solution (described below) will correct this. The use of a rubber stopper prevents the escape of CO_2 from the solution and obviates a great deal of the trouble encountered with the use of cotton plugs. Tissue culture is performed on tissue from each donor beginning with the receipt of the material and continuing at 7-day intervals thereafter for the period of storage. One segment of the vessel is used for this purpose only. Because this procedure requires removal of the vessel from the container and increases the danger of trauma to or bacterial contamination of the specimen, this portion of vessel is never used for grafting. Since all segments of vessel in a given case come from the same person and are stored in the same fluid, the results of culture on this specimen are considered indicative of the state of the remainder of the vessel segments. Tissue culture is also performed on the portion of the vessel segment removed with the attached suture when it is used in a graft. At present, the results of tissue culture insofar as the success of the grafting is concerned has not been correlated, but future evaluation of this data may aid in clarifying this point. All preserved vessels are discarded after 28 days of storage.

Because practically all vessel grafting procedures are elective, notification of the bank relative to the procedure should take place 72 hours in advance of the operation when possible. The surgeon should select the bottles which he wishes sent to the operating room so that bacterial cultures may be begun on these specimens. On request from the operating room, near the time of prospective use of the graft, the desired specimens are issued. These are placed in a refrigerator at 4°C. in the operating room until needed. All unused vessel segments are returned to the blood vessel bank as soon as it is determined that they will not be required. Complete records are kept on each segment used and returned unused vessel segments are subjected to the same procedures that are outlined above for newly acquired vessels.

PREPARATION OF STORAGE MEDIA

The preserving fluid consists of a balanced salt solution *(4)* to which streptomycin and penicillin plus 10 percent human plasma are added. One liter of stock balanced salt solution is prepared according to the following formula:

Sodium chloride	80.0 gm.
Potassium chloride	4.0 gm.
Magnesium sulfate	0.8 gm.
Magnesium chloride	0.8 gm.
Calcium chloride	1.84 gm.
Dibasic anhydrous sodium phosphate	0.6 gm.

Monobasic potassium phosphate	0.6 gm.
Dextrose	10.0 gm.
Phenol red (0.4% solution)	50.0 ml.
Triply distilled water q. s. ad.	1,000.0 ml.

This stock solution may be stored at room temperature with the addition of 1 ml. of chloroform.

A buffer solution is then prepared according to the following formula:

Sodium bicarbonate	1.4 gm.
Triply distilled water q. s. ad.	100.0 ml.

100 ml. of stock solution is then diluted to 1,000 ml. and sterilized by autoclaving for 15 minutes at 15 pounds pressure. The buffer solution is sterilized by Seitz filtration. The pH of the salt solution is then adjusted to pH 7.6 by adding buffer solution and titrating with a Beckman pH meter. One hundred milliliters of reconstituted irradiated human plasma is then added. Human serum may be used in place of the latter. Lastly, 50 units of penicillin and 50 micrograms of streptomycin per ml. of preservative solution are added aseptically. Equal portions of the solution are then introduced aseptically into 5 cleaned and sterilized 250-cc. blood-bank bottles. These bottles are prepared by removing the rubber stoppers, discarding the Alsever's solution which they contain and washing repeatedly in distilled water. The bottles are then closed with rubber plugs, the rubber stoppers are wrapped separately, and both the bottles and stoppers are autoclaved at 15 lb. for 15 minutes. After filling with the complete preservative fluid, the bottles are stored in the refrigerator until needed for vessel storage.

TISSUE CULTURE

A. *Preparation of material for tissue culture*

1. Chicken embryo extract is prepared from fertilized eggs which have incubated for 9 or 10 days. The surface of the egg is cleansed with iodine or merthiolate and the shell overlying the air space is cracked. The embryo is grasped with a sterile forceps and placed in a sterile Petri dish containing a small amount of salt solution. About 3 eggs are used each time. The embryos are minced with detached knife blades or shears using aseptic technic. The minced embryos are transferred to a 50-cc. sterile heat-resistant test tube and diluted with 4 times their volume of balanced salt solution. The material is agitated and centrifuged. The clear supernatant fluid is drawn off and stored in sterile rubber-capped vials for use in tissue culture.

2. Human cord serum is readily obtained from the obstetrical service. Sterile 250-cc. centrifuge tubes are used for collecting the blood. After clotting of the blood, serum is withdrawn and placed in sterile, rubber-capped vials.

3. Dehydrated chicken plasma is obtained commercially. When reconstituted with sterile distilled water, each vial contains 5 cc. of plasma.

4. All glassware and instruments are prepared by thorough cleansing and rinsing in distilled water. These materials are then autoclaved.

B. *Tissue culture technic.* Small fragments, about 1 mm. square, are cut under sterile precautions from the portion of aorta to be cultured. About 0.4 cc. of chicken plasma is added to a sterile 15-mm. heat-resistant tissue culture tube by means of a drawn capillary pipette with an attached small rubber suction bulb. The plasma is spread over the lower portion of the culture tube. The small fragments of tissue to be cultured, usually 8 or 10 in number, are placed in the upper portion of the tube with a small thin-tipped pipette. These are placed in a dry portion of the tube and the excess fluid associated with the fragments is sucked off with the thin-tipped pipette. After the excess fluid has been removed, the fragments are placed within 0.5 to 1 inch of the bottom of the tube. The tissue in the presence of the chicken plasma produces coagulation and the fragments become adherent to the inner surface of the tube after about 10 minutes. The end of the tube is carefully flamed each time it is entered during this procedure and strict asepsis must be observed throughout the procedure. The tube is then stoppered and as soon as the tissue is adherent to the side of the tube, the tube is placed in the roller drum and rotated for 2 hours. The temperature of the roller drum is 37°F. Following this, 2 parts each of human cord serum and chick embryo extract, plus an equal part of balanced salt solution, are added to the tube. The tubes are checked daily under the low power of a microscope for evidence of fibroblastic proliferation at the borders of the explanted tissue fragments. Fragments of 9- or 10-day chick embryos are cultured at the same time to serve as a control culture.'

EQUIPMENT AND PERSONNEL REQUIRED

A. *Material for preservation of tissue*

1. Balanced salt solution (Hank's modified Tyrode's solution).
2. Human plasma or serum, and antibiotics.
3. 250- ml. blood-bank bottles.
4. Refrigerator—blood-bank type.
5. Bacterial culture apparatus.
6. Forceps, shears, and detached scalpel blades.
7. Sterilizing equipment.
8. No. 7 rubber stoppers.

B. *Tissue culture operational procedure*

1. Bacteriologic incubator, air-jacket type, stabilized at 37.5°C.
2. Wyble roller tube apparatus.
3. 7-mm. heat-resistant tubing for preparing pipettes.
4. 15 by 150 mm. heat-resistant test tubes.
5. Solutions:
   a. Balanced salt solution (identical with that used in preparing preservative media for blood vessels).
   b. Chicken plasma.

c. Human cord serum.
d. Sterile Petri dishes (ordinary bacteriologic type).
e. Chicken embryo extract.
f. Sterile detached blades and shears.
g. A hood is desirable, but not essential, if a sterile working area is available.

C. *Personnel required.* An officer of the surgical service should supervise all details pertaining to the acquisition of specimens. One laboratory officer should be responsible for supervising the blood vessel bank, preparation of solutions, and all laboratory procedures required. Close liaison should be maintained between these two officers. At this hospital a civilian consultant in tissue culture procedures was engaged. One technical assistant in the laboratory should be available for such details as preparation of media, preparation and sterilization of equipment, and performance of bacterial and tissue culture procedures.

BOOK REVIEW

Visceral Radiology, by *Emerik Markovits,* M. D. Formerly, Scientific Collaborator of the Central Radiologic Institute of the General Hospital (Holzknecht-Institute), Vienna; Head of the Radiologic Department of Elizabeth Hospital of the City of Budapest; Postgraduate Lecturer at the Central Radiologic Institute of the University of Budapest; Radiologist of the Steiner Clinic, Atlanta, Ga. 612 pages; illustrated. The Macmillan Co., New York, N. Y., publisher, 1951. Price $24.

This book supplements "Bone and Joint Radiology," published by the same author in 1949. The author states that it is intended for the diagnostician. The book is divided into the following parts on a basis of systems: (1) the chest and respiratory system; (2) the circulatory system; (3) the digestive system; (4) the abdominal organs and abdomen; (5) the genitourinary system; and (6) the central nervous system. The major subjects are introduced by a concise review of anatomy and physiology. The book contains numerous illustrative roentgenograms, supplemented by sketches and drawings illustrating gross radiologic findings and normal anatomy. It also contains many differential diagnostic lists and tables. Apparently for the purpose of completeness, some of these are of a general nature and are too lengthy to be of any great value. The volume should be of value to residents and practitioners of radiology, but it is not a comprehensive text. It is attractively bound and is printed on good quality paper.

—*Col. D. F. Dullum, MC, U. S. A.*

UROLOGY AWARD

The American Urological Association offers an annual award of $1000 (first prize of $500, second prize of $300, and third prize of $200) for essays on the result of some clinical or laboratory research in urology. The competition shall be limited to urologists who have been in such practice for not more than 5 years and to men *in training* to become urologists. The first prize essay will appear on the program of the forthcoming meeting of the American Urological Association, to be held in Atlantic City, N. J., 23 to 26 June 1952. For full particulars write the Secretary, Dr. Charles H. de T. Shivers, Boardwalk National Arcade Building, Atlantic City, N. J. Essays must be in his hands before 15 February 1952.

Treatment of Leukemia and Similar Disorders[1]

Richard H. Smith, *Lieutenant, junior grade, MC, U. S. N. R.*

ABOUT 10 percent of the annual deaths from cancer are caused by malignant diseases of the reticuloendothelial system (2). Leukemia is probably a neoplastic disease arising in hematopoietic tissue and consisting of abnormal and widespread proliferation of leukocytes and their precursors in the tissues of the body. It is noted for its rapid progression to death and to date few persons have been observed as apparently cured. At a recent conference on leukemia it was stated that 10 percent of 300 children had spontaneous complete or partial remissions averaging slightly under 10 weeks in duration and that spontaneous remissions occur in from 1 to 2 percent of adults.(3) Acute leukemia usually causes death of the patient within from a few weeks to 6 months, although the patient with chronic leukemia may live for 10 or more years. Although means are constantly being sought to cure the condition permanently, present methods of therapy seldom do more than prolong life for a short time and relieve symptoms temporarily, but there have been scattered cases of prolonged remission.

Other conditions involving the blood-forming organs, such as Hodgkin's disease, lymphosarcoma, reticulum cell sarcoma, multiple myeloma, and several conditions the histology of which is obscure, are usually considered together with the leukemias. The prognosis of these diseases is generally as hopeless as that of the true leukemias. Treatment of the conditions mentioned is similar to that of leukemia.

TREATMENT

General measures of therapy have not changed materially in the last few years, nor have there been many advances in specific measures. It is not my purpose in this review to describe general adjuvant thera-

(1) Presented at the Weekly Staff Meeting of U. S. Naval Hospital, Philadelphia, Pa., 16 February 1951.

(2) Erf, L. A.: Treatment of leukemia and allied disorders. Presented at the Annual Convention of the Medical Society of the State of Pennsylvania, 1950.

(3) Dameshek, W.; Freedman, M. H.; and Steinberg, L.: Folic acid antagonists in treatment of acute and subacute leukemia. Blood 5: 898-915, Oct. 1950.

peutic methods or to elaborate on the technics of specific therapy, but rather to summarize the presently accepted specific methods and some of those still in the early stages of investigation. The main groups of therapeutic agents of proved or promising value include: (1) roentgen radiation and radioactive isotopes, (2) nitrogen mustards, (3) urethane, (4) folic acid antagonists, and (5) ACTH and cortisone.

Roentgen radiation. Acute, subacute, and aleukemic leukemia are not helped by roentgen rays and, in fact, may be made worse by this treatment. Radiation has been implicated as a cause of acute leukemia (4). Total body irradiation is the most satisfactory treatment of chronic myelogenous leukemia, except for patients with splenomegaly, in which cases the rays are directed to the spleen (5). Chronic lymphatic leukemia is best treated with localized roentgen rays. Roentgen therapy can prolong life, but it should be started as soon as indicated by symptoms or by a leukocyte count of 40,000 or more. The dose must be such that radiation sickness is avoided. Roentgen ray therapy is usually combined with blood transfusions and antibiotics. The average prolongation of life in chronic leukemia is 6 months and the combination of measures controls symptoms for about 85 percent of this time. Radiation is preferred by many in the treatment of Hodgkin's disease, lymphosarcoma, reticulum cell sarcoma, and multiple myeloma, and its effects depend on the extent of invasion by the neoplastic cells.

Radioactive isotopes. These are given under the same conditions as is roentgen therapy because they are only another mode of administration of radiation, but this method offers wide tissue dispersion, especially important with beta rays, a mild and prolonged effect, and absence of radiation sickness. Of these isotopes radioactive phosphorus (P^{32}) has been the one most widely used. It emits beta rays and is given intravenously as the sodium monohydrogen salt in a 5-millicurie dose (from 2 to 2.5 mc. 2 or 3 times a week) until a desirable effect has been obtained, to be repeated in about 8 weeks if needed. It is most quickly absorbed by actively growing cells to retard mitosis. Although its greatest value is in the treatment of chronic myelogenous and chronic lymphatic leukemia, its popularity has faded. It has little effect in other leukemias. Radiostrontium also produces beta rays but has a dangerous disadvantage in that its half-life is 25 years. It is useful in treating superficial lesions with minimal irradiation of underlying tissues (6). Radiosodium emits both beta and gamma rays and is not used clinically. Diamond et al. (7) reporting a series of 71 patients found no benefit from radiation in any of those with acute lymphatic leukemia; those with

(4) March, H. C.: Leukemia in radiologists in a 20-year period. Am. J. M. Sc. 220: 282-286, Sept. 1950.

(5) Sturgis, C. C.: Recent advances in treatment of hematologic disorders. J.A.M.A. 141: 969-973, Dec. 3, 1949.

(6) Hunt, H. B.: Role of radioisotopes in blood dyscrasias and neoplastic diseases. Texas State J. Med. 46: 496-503, July 1950.

(7) Diamond, H. D.; Craver, L. F.; Woodward, H. Q.; and Parks, G. H.: Radioactive phosphorus. I. In treatment of lymphatic leukemia. Cancer 3: 779-788, Sept. 1950.

chronic lymphatic leukemia were treated with P^{32}. Five years after the first hospital visit 11.3 percent were still living and 5 years after the onset of the first symptoms 24.5 percent were still alive. The 8-year survival rate of this group was 1.9 and 7.6 percent, respective of the above dates. Lawrence et al. (8) reporting a series of 100 patients with chronic lymphatic leukemia treated with P^{32} found 33 living 5 years and 10 living 8 years after the onset of the first symptoms.

Nitrogen mustards. Methyl-*bis* (beta-chloroethyl) amine and methyl-*tris* (beta-chloroethyl) amine are powerful cellular toxins which seem to prefer actively growing cells, as seen by the leukopenia and bone marrow and lymphatic tissue destruction in those soldiers on whom the toxin was used in World War I. Results in treatment of chronic myelogenous and chronic lymphatic leukemia with them have been fairly good, but the conclusion of many is that nitrogen mustards should be used only when patients with Hodgkin's disease, lymphosarcoma, and reticulum cell sarcoma become refractory to radiation (5, 9). The usual dose is 0.1 mg. per kg. of body weight, given on successive or alternate days for 4 doses. It is administered intravenously, being especially careful to avoid venous thrombosis or leakage into the tissues. The total amount should not be more than 24 mg. in any one course. One or more hours after injection half the patients become nauseated and have moderate to severe vomiting, but this usually disappears within a few hours. These side effects may be decreased by giving 100 mg. of pyridoxine intravenously or intramuscularly one-half hour following the injection of nitrogen (9). Pyridoxine and one of its derivatives have themselves been tried in the treatment of leukemia (10). Aromatic and aliphatic nitrogen mustards have been studied (11) and one of them, R48 (beta-naphthyldi-2-chloroethylamine), was tried in several of the chronic forms of these diseases. Five patients with Hodgkin's disease each had one remission following treatment with this drug but two patients with acute leukemia and two with reticulosarcoma showed no remission. Of three patients with chronic myelogenous leukemia one had several remissions and of four patients with chronic lymphatic leukemia two had definite and repeated remissions. The usual dose in these patients was 300 to 400 mg. daily, the course varying from 2 to several weeks. Fewer toxic effects were noted than with methyl-*bis* (beta-chloroethyl) amine and the newer compounds were noted to work more slowly and were more easily controlled. Because of the depressant action of all nitrogen mustards on hematopoietic tissues, danger-

(8) Lawrence, J. H.; Low-Beer, B. V. A.; and Carpender, J. W. J.: Chronic lymphatic leukemia; study of 100 patients treated with radioactive phosphorus. J.A.M.A. 140: 585-588, June 18, 1949.

(9) Craver, L. F.: Recent advances in treatment of lymphomas, leukemias, and allied disorders. Bulkley Lecture. Bull. New York Acad. Med. 24: 3-25, Jan. 1948.

(10) Gellhorn, A., and Jones, L. O.: Pyridoxine deficient diet and desoxypyridoxine in therapy of lymphosarcoma and acute leukemia in man. Blood 4: 60-65, Jan. 1949.

(11) Matthews, W. B.: Trial of beta-naphthyldi-2-chloroethylamine (R48) in leukaemia, Hodgkin's disease, and allied diseases. Lancet 1: 896-899, May 13, 1950.

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ously low red and white blood cell counts must be guarded against by frequent observation and by regulation of the dose.

Urethane. Five years ago, about 100 years after urethane (ethyl carbamate) was first synthesized, a decreased leukocyte count was noticed in patients treated for malignancy with this drug. It is probably a cellular toxin inhibiting the mitosis of actively growing cells. It is beneficial in treating chronic myelogenous leukemia and of slight value against chronic lymphatic leukemia, but of no value against acute leukemia. Good results have also been reported following its use for multiple myeloma (*5, 12*). For chronic myelogenous leukemia it can be given combined with roentgen radiation in patients whose symptoms are mild. One dosage schedule is 0.3 gram (1 enteric-coated tablet) t.i.d., the total daily dose being increased by 1 tablet daily until a maximum of 10 tablets daily is attained. The leukocyte count will decrease in from 2 to 4 weeks and, after it reaches normal, a daily maintenance dose of from 1 to 1.5 gram is given (*5*). As in the use of the nitrogen mustards, frequent blood counts and adjustment of the dose are mandatory. The results obtained with urethane therapy do not warrant much hope for its future.

Folic acid antagonists. These appear to be the most promising new agents in the treatment of leukemia. Folic acid had been tried in the treatment of pernicious anemia and other megaloblastic macrocytic anemias in its growth-promoting capacity and it was assumed that agents antagonistic to the growth factor could be applied to the immature cells of acute leukemia (*13-15*). After trials with folic acid and trifolic acid the next step was to propose that an antagonist of folic acid be synthesized to replace folic acid in order to inhibit growth. Hence, slight changes were made in the folic acid structure to produce 4-aminopteroylglutamic acid and other compounds. Folic acid antagonists produce a deficiency of folic acid, which may be irreversible, as proved in animals (*16*). The mechanism may be the prevention of the conversion of folic acid into a more active compound or there may be a specific, direct effect of the folic acid antagonists on cell growth. Dosage has been established by Farber (*17*) as 0.5 to 1 mg. daily for aminopterin;

(*12*) Loge, P. E., and Rundles, R. W.: Urethane therapy in multiple myeloma. Blood 4: 201-216, Mar. 1949.

(*13*) Symposium: Effects of derivatives of folic acid on certain types of neoplastic disease. Tr. New York Acad. Sc. 10: 68-103, Jan. 1948.

(*14*) Farber, S., and others: Temporary remissions in acute leukemia in children produced by folic acid antagonist, 4-aminopteroylglutamic acid (aminopterin). New England J. Med. 238: 787-793, June 3, 1948.

(*15*) Dameshek, W.: Chemotherapy of "lymphoma" and leukemia. Bull. New England M. Center 11: 49, Aug. 1949.

(*16*) Franklin, A. L.; Stokstad, E. L. R.; and Jukes, T. H.: Observations on effect of 4-aminopteroylglutamic acid on mice. Proc. Soc. Exper. Biol. & Med. 67: 398-400, Mar. 1948.

(*17*) Farber, S.: Some observations on effect of folic acid antagonists on acute leukemia and other forms of incurable cancer. Blood 4: 160-167, Feb. 1949.

3 to 5 mg. daily for a-methopterin; and 25 to 50 mg. daily for amino-anfol. Farber et al. (14) and later Dameshek (3, 15) observed dramatic remissions of acute and subacute leukemia in children and adults using these drugs. Complete remission may occur in from 25 to 60 percent of the children treated and last from 6 weeks to 2 years, which is a big step forward in the management of this otherwise rapidly progressive disease. Repeated remissions have occurred (18). The remission rate in adults with leukemia so treated has been much lower (19, 20). There is in every case the danger of folic acid deficiency. This can be prevented by administering folic acid or trifolic acid before giving the folic acid antagonist, but is only partially prevented if the folic acid is administered later (21). A compound has been isolated which is necessary to the growth of a certain species of bacterium and is designated as the citrovorum factor. According to recent work (22) this factor seems to be several times more active than either folic acid or trifolic acid in blocking the deficiency-producing action of the folic acid antagonists and, hence, can prevent the chemotherapeutic effects thereof (23). Still more recent observations show that the citrovorum factor can be used in folic acid antagonist therapy to prevent only the toxic symptoms (22). The dosage is not yet established.

ACTH and cortisone. Possibly as promising as the folic acid antagonists are these two drugs, the action of which is still not completely known despite intensive research by many workers. Physiologic effects are the same as in other patients. The usual dose administered is from 100 to 300 mg. of cortisone and 200 mg. of ACTH for adults and 50 to 75 percent of the adult dose for children. It is given continuously for about 25 days if possible in one course (24). The results obtained so far have been almost as good as those obtained with the folic acid antagonists, with the added advantage of a high percentage of remissions in patients with the chronic leukemias, Hodgkin's disease, and lymphosarcoma. In some patients there were several successive remis-

(18) Seaman, A. J.; Koler, R. D.; Stack, T.; and Osgood, E. E.: Aminopterin therapy in acute and subacute leukemias and in terminal acute exacerbations of chronic granulocytic leukemia. Am. J. Med. 8: 522, April 1950.

(19) Neligh, R. B.; Bethell, F. H.; and Meyers, M. C.: Effect of pteroylglutamic acid inhibitor in leukemia and related disorders. Am. J. Med. 5: 624, May 1948.

(20) Heinle, R. W.: Treatment of acute leukemia in childhood. Ohio State M. J. 46: 133, Feb. 1950.

(21) Weber, E. J., et al.: Treatment of acute leukemia of childhood with folic acid antagonists. J. Pediat. 36: 69, Jan. 1950.

(22) Schoenbach, E. B.; Greenspan, E. M.; and Colsky, J.: Reversal of aminopterin and amethopterin toxicity by citrovorum factor. J.A.M.A. 144: 1558-1560, Dec. 30, 1950.

(23) Burchenal, J. H.; Babcock, G. M.; Broquist, H. P.; and Jukes, T. H.: Prevention of chemotherapeutic effects of 4-amino-N^{10}-methyl-pteroylglutamic acid on mouse leukemia by citrovorum factor. Proc. Soc. Exper. Biol. & Med. 74: 735-737, Aug. 1950.

(24) Stickney, J. M.; Heck, F. J.; and Watkins, C. H.: Cortisone and ACTH in management of leukemia and lymphoblastoma. Proc. Staff Meet., Mayo Clin. 25: 488-489, Aug. 16, 1950.

sions (25) and in others a second remission could not be induced (24, 26). A favorable reaction consists of an increase in peripheral reticulocytes and in marrow normoblasts, possibly an increase in the erythrocyte count and hemoglobin, and a return of the differential leukocyte count to normal. The severe cytotoxic effects of folic acid antagonists have not been cited, but there may be moderately severe leukopenia. In patients with chronic lymphatic leukemia, Hodgkin's disease, and lymphosarcoma there may be regression in the size of lymph nodes, liver, and spleen with or without microscopic changes in specimens taken at biopsy. Patients having a remission usually begin to experience subjective improvement within 2 or 3 days. Remissions last from 2 days to many weeks.

Other drugs. Several other drugs may be mentioned briefly because of limited use and questionable value. Colchicine has been shown to interrupt cell growth in mitosis. Bacterial polysaccharides have been tried without much effect. Stilbamidine (27) and antimony (28) produce a slight clinical improvement in multiple myeloma. Replacement transfusion is popular in some circles in the specific treatment of acute leukemia. Normal and polycythemic blood may contain an antileukemic factor (29). One patient with acute leukemia had several remissions over an 18-month period, during which time 168 transfusions and 19 exsanguinotransfusions were performed and both urethane and aminopterin were used, but he eventually died (30). In another patient partial exsanguinotransfusion gave a better remission than did the previous administration of aminopterin (31). In a more complete analysis Bessis and Dausset (32) using this method produced temporarily 12 complete remissions and 30 partial remissions in 60 patients with acute leukemia.

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(25) Spies, T. D.; Stone, R. E.; Garcia López, G.; Milanés, F.; López Toca, R.; and Reboredo, A.: Response to adrenocorticotropic hormone and cortisone in persons with carcinoma, leukaemia, and lymphosarcoma. Lancet 2: 241-244, Aug. 12, 1950.

(26) Pearson, O. H., and Eliel, L. P.: Metabolic effects of ACTH in acute leukemia. J. Clin. Investigation 29: 838-839, June 1950.

(27) Propp, S.; Gorham, L. W.; and Kantor, S.: Recent studies of multiple myeloma; sternal and rib puncture and the results of treatment with stilbamide. Blood 4: 36-53, Jan. 1949.

(28) Rubenstein, M. A.: Use of antimony in multiple myeloma. Blood 4: 1068-1072, Dec. 1949.

(29) Henstell, H. H. et al.: Replacement transfusions in treatment of acute leukemia. Ann. West. Med. & Surg. 3: 371, Nov. 1949.

(30) Cattan, R.; Bessis, M.; and Ely, Z.: Leucose aiguë traitée pendant 18 mois notamment par 19 exsanguino-transfusions et 168 transfusions. Bull. et mém. Soc. méd. hôp. Paris, 65: 1109-1122, Oct. 14, 1949.

(31) Ross, R. T., and Schoemperlen, C. B.: Effects of aminopterin and partial exsanguinotransfusion in case of stem-cell leukemia. Ann. Int. Med. 32: 123, Jan. 1950.

(32) Bessis, M., and Dausset, J.: Étude critique des rémissions au cours des leucémies aiguës traitées par exsanguino-transfusions (comparaison avec les rémissions spontanées et celles induites par les antagonistes de l'acide folique). Rev. Hémat. 5: 188-225, 1950.

TABLE 1. *Treatment of choice for the leukemias and related diseases*

Disease	Therapy, in order of choice	Dosage	Effect of therapy
Acute and subacute leukemia	Folic acid antagonists		
	Aminopterin	0.5-1 mg.	Partial to complete remission in 30-50% for few wks. to 2 yrs.
	A-methopterin	3-5 mg.	
	Amino-an-fol	25-30 mg.	
	ACTH	200 mg.	
	Cortisone	100-300 mg.	
Chronic myelogenous leukemia	Spray roentgen rays (except local for splenomegaly)	15-20 r. daily or every other day	Prolongs life for about 6 mo. and relieves symptoms
	Radioactive phosphorus	5-7 mc. intravenously, repeated in 6-8 wk. if needed	Short to long remission
	Urethane	Up to 3 grams daily until remission then 1-1.5 gram	Similar to but less than effects with radiation
	ACTH	As above	No better than other treatment
	Cortisone		
Chronic lymphatic leukemia	Local roentgen rays	50-100 r. every other day	Prolongs life 6 mo.-2 yr. and relieves symptoms
Hodgkin's disease	Roentgen rays	Highly individualized	Prolongs life 2 or 3 yr.
	Nitrogen mustards	0.1 mg. per kg. intravenously on 4 successive or alternate days	Prolongs life a few weeks to a year with relief of symptoms
	ACTH	As above	No better than other treatment
	Cortisone		
Lymphosarcoma	Roentgen rays	Individualized	Short prolongation of life with partial remission
	Nitrogen mustards	Same as for Hodgkin's disease	Same as for Hodgkin's disease
	ACTH	As above	No better than other treatment
	Cortisone		
Reticulum cell sarcoma	Roentgen rays	Individualized	Same as for Hodgkin's disease
	Nitrogen mustards	Same as for Hodgkin's disease	Same as for Hodgkin's disease
	ACTH	As above	No better than other treatment
	Cortisone		
Multiple myeloma	Roentgen rays	Individualized	Relieves local bone pain
	Stilbamidine	50-150 mg. daily, total 4.5 grams	Slows progress and relieves pain
	Urethane	Not generally used	Slight clinical improvement

SUMMARY

Treatment of leukemia had not been very successful with radiation or with any drugs until the folic acid antagonists, ACTH, and cortisone were developed. The former gives a fair number of temporary remissions in patients with acute leukemia and the latter two give remissions in patients with acute or chronic leukemia and in some of the related diseases. The disease in some patients with Hodgkin's disease, lymphosarcoma, and reticulum cell sarcoma has been successfully retarded for weeks with radiation and nitrogen mustards. Table 1 lists the more widely accepted specific treatment for each of these diseases.

BOOK REVIEW

Bacteriological Technique, a Guide for Medical Laboratory Technicians, by *W. W. W. McEwen,* A. I. M. L. T., F. R. M. S., Bacteriologist, Messrs. Lantigen (Eng.) Ltd., Late Chief Technician and Lecturer in Bacteriology, Nottingham and District Technical College, Nottingham; with a foreword by *Professor Sir Alexander Fleming,* F. R. C. P., F. R. C. S., F. R. S. 293 pages; 70 illustrations. Chemical Publishing Co., Inc., Brooklyn, N. Y., publishers, 1950.

McEwen's guide for medical laboratory technicians is the answer to many of the perplexing problems that arise daily in most laboratories. The author's experience and ingenuity in coping with the technical problems of the bacteriologic laboratory through the years are recorded in a facile style. This text is highly recommended to all who are concerned with setting up a bacteriologic laboratory. Too frequently little thought is given to such important problems as a cleaning and preparation room, a separate media room or kitchen, the type of flooring necessary to good sanitation, the proper height of laboratory work benches, and adequate hot and cold water supply, draining racks, and above all, if animals are used, how to set up an animal room properly.

A good share of this book is devoted to the proper care of laboratory equipment and glassware. Many valuable suggestions are given on the means of fabricating special equipment. Numerous figures, many of which are by the author, aptly supplement the text and should excite the reader's ingenuity in evolving contraptions of his own to fit the many problems which arise in every laboratory.

Many laboratory manuals are written primarily for the college or medical student but this one is written for the technician in the field and helps to fill a large gap in our literature.

—*Maj. Albert Leibovitz, MSC. U. S. A.*

Defensive Medical Aspects of Biologic Warfare

Matthew J. Hantover, *Captain, MC, U. S. N.*

THE awareness of and need for defensive measures against biologic warfare is appreciated by most people associated with the medical sciences. The medical defensive aspects are similar whether infection is spread by a natural or an artificial mode of propagation. The methods and technics involved in preventing the transmission of disease in the usual manner should apply also to the artificial transmission, but more rapid detection and identification is necessary in the latter case.

The deliberate use of bacteria, viruses, rickettsia, fungi, and toxic agents derived from living organisms to produce death or disability in man, animals, and plants requires quick detection and identification so that adequate control measures may be instituted to protect personnel and prevent epidemics. Any delay in determining the agent used will delay specific preventive and therapeutic measures and prolong the epidemic. It may be necessary to begin therapy based on signs and symptoms alone before laboratory reports are available. Development of rapid detection and identification methods, involving special technics or devices, is, however, necessary to expedite scientifically sound therapy to replace empirical treatment. The decontamination of personnel and terrain is essential to prevent the development of secondary aerosols and contagion. The unfavorable aspects of biologic warfare stem from ignorance of cause and effect and they may be prevented by educational means to insure an understanding of modern precepts of preventive medicine.

With other bureaus and departments of the Armed Forces, medical and allied science officers should coordinate their efforts to eliminate infection and disease. They should assist in the training of personnel in detection and identification, protection, prevention, decontamination, and treatment of casualties resulting from biologic warfare and at the same time evolve psychologic methods to prevent fear, anxiety, and hysteria. Because the most important intended victims of biologic warfare would be man and his food sources, it is necessary to evolve

methods of protection for both. Planning for defense should consist primarily of such basic and practical considerations as will (1) insure the survival of persons so that they may carry out their assigned missions and (2) insure research and development in the various phases of biologic warfare which would help to minimize the effects of an attack.

The objectives of biologic warfare defense are concerned with: (1) knowledge of the offensive possibilities of an enemy; (2) recognition of an attack; (3) detection and identification of the agent used; (4) individual and collective protection; and (5) treatment, decontamination, and psychologic therapy.

In order to promulgate defensive measures, we must be aware of the agents used, methods of transmission, availability and productive capacity of the enemy, immunologic response, and character of weapons overtly or covertly used. Intelligence agencies should present to proper authorities all pertinent available information that would enable us to prepare for any and all eventualities. It is necessary to cooperate with the civil authorities in all matters pertaining to the health and well-being of the people. There must be integration of ideas and methods between the Federal, state, local, and military authorities to minimize the effects of such an attack. We must train sufficient personnel in the prevention of spread and in the protection of the individual and the masses. We must know when, why, where, and how to isolate patients in order to break the chain of infection, prevent spread of diseases, and curtail panic. We must detect and identify the agent or disease by (1) sampling of water, food, air, animals and other vectors; (2) clinical means; and (3) laboratory examination of the tissues or fluids of the victims. We must know how, why, when, and where to decontaminate and we must endeavor to procure a common decontaminant that will make the contaminant inert.

Accredited laboratories are essential and have as their primary objective detecting and identifying the agents used by the enemy so that adequate and specific remedies can be used. They also assist in research and development of new methods in combating disease. Laboratories of the military establishment and of the Public Health Service, state and local health departments must coordinate their efforts to get the job done expeditiously. Trained and qualified sanitary and epidemiologic personnel are also an integral component of the biologic warfare defense organization.

The basic method of aerosol cloud detection is air sampling for micro-organisms. A wide variety of instruments, such as cotton impinger, liquid impinger or bubbler, and recently developed filters, is available for this purpose. The cotton impinger is designed to filter air through cotton. Suspended organisms, being trapped on the filter, may then be recovered and identified. The cotton impinger consists of facer pellets of cotton packed in a glass holder. The glass holder is a tube tapered at one end to a small bore to which is attached a small

hand pump. A one-hole rubber stopper with a section of glass tubing is attached to the larger bore end. A small section of wire gauze is placed in front of the cotton in the impinger so that there will be more even distribution of the particles on the cotton. The impinger must be sterilized and cotton-stoppered to keep it sterile. In preparation for immediate use, the cotton stopper in the small bore end of the tube is removed and the hand pump is attached. Then the cotton stopper in the glass tube and the rubber stopper are removed and the sample taken. After the sample is taken, the pump is removed and the sample is properly sealed by a rubber policeman. It is placed in a sample mailing case and sent to the laboratory for identification. The cotton impinger is believed to be the most practical method of sampling air containing sporulating organisms. It is not very useful, however, for the collection of vegetative forms.

The bubbler consists of a 50-ml. round-bottomed distilling flask with a side arm and a straight glass tube with a small bulb blown onto one end. About 25 holes are punched through this small glass bulb and the tube is then fitted with a one-hole rubber stopper and plugged into the flask. Ten milliliters of chlorine-free water are placed in the flask and the small bulb of the straight tube is brought below the surface of the water. Air is evacuated from the side arm by means of a small hand pump and the organisms are trapped in the liquid. Other filters and microbiometers are being developed for more rapid detection and identification. Cotton swabbings of the nares, throat, mouth, eyes, ears, and skin may be used to advantage as a tool for detection. Tests have shown that best results are obtained from those of the mouth.

The effectiveness, for direct defensive purposes, of detecting the presence of a cloud of pathogens will vary with the incubation period of the diseases. For several potential biologic warfare agents with long incubation periods, early detection should give ample warning and lead to effective control measures. If the incubation period were shorter than the time necessary for identification, the first indication that a biologic warfare attack had occurred probably would be a definite case of the disease. Even if the incubation period for the specific agent used were short, an effective detection grid would provide necessary information as to the distribution and concentration of the agent. A detection grid is any system of detection devices which would collect or provide the necessary information on the probable presence of a disease agent.

The reporting of cases of diseases as caused by a biologic warfare attack would be necessary to provide effective treatment and to limit the spread of the disease. A system for such reporting should be based on the routine morbidity reporting mechanisms maintained by existing military and health agencies. It depends primarily on physicians, hospitals, and diagnostic laboratories in the community, but might have to be supplemented by using wardens to report the number of

persons ill in their areas and developing studies of absenteeism from industries and schools. Evidence against covert biologic warfare attack may thus be ascertained. There must be a central focus toward which all data pertaining to biologic warfare attacks may be directed. Statistical interpretations must be correlated so that a true picture can be formed and the necessary means taken to prevent spread of the disease.

Protection against a biologic warfare attack must include both individual and collective means. Personnel protection consists of respiratory protectors such as (1) masks, canisters, and hoods, (2) protective clothing, and (3) active and passive immunization. Active immunization offers by far the most effective defense against biologic agents for which vaccines are available. Vaccines which are only partially effective might also be widely used because they probably would reduce the incidence of disease from a specific agent or reduce the duration of infection. Multiple vaccines, containing a variety of antigens in relatively small amounts so that one course of immunization would protect against a variety of biologic warfare agents, may be developed.

Collective protection is an endeavor to prevent morbidity and mortality to a population by the use of shelters that are impervious to biologic warfare agents. These shelters must be equipped with positive pressure and must have adequate filters (including impingers, electrostatic precipitators and bubblers) as detection devices. The designing of air-conditioning units with filters or electrostatic precipitators so that optimum protection from overt and covert acts can be given in critical target areas seems necessary.

Decontamination should be carried out by the sanitary services. Flushing with a fire hose would in large measure decontaminate the ground and external surfaces of buildings. In selected instances, hypochlorite solution or other readily available and cheap disinfectants might be used effectively. For indoor decontamination, simple washing of walls and floors, triethylene glycol vaporizers, ultraviolet-ray apparatus, and airing and sunning of rugs, draperies, and furniture would be the simplest procedures. Decontaminating the aerosol cloud by artificial wind machines blowing it away from critical target areas may become necessary.

Each disease, whether caused by biologic warfare agents or not, must be treated by appropriate measures. Because the portal of entry of a biologic agent may vary, bizarre symptoms may result. The usual methods for combating diseases should be applied.

We should inform the people of the cause and effect of biologic warfare agents and transform the unknown to known. The signs and symptoms of the diseases suspected should be described in simple language and prophylactic and therapeutic measures advocated so that the chain

of infection can be broken and secondary cases prevented. It is important that information on the immunization program be widely circulated and control measures instituted at the earliest moment in order to curtail spread and allay panic.

CONCLUSIONS

The main endeavor in biologic warfare defense is to understand the cause and effect of disease entities and to acquire means of early recognition and treatment. It is essential that those so indoctrinated learn to detect and identify biologic agents and prevent infection to themselves and others. Decontamination and sterilization procedures should be applied to protect oneself and others and prevent secondary cases from developing. Medical officers should participate in the immunization and chemotherapeutic program in the prophylaxis, prevention, treatment, decontamination, and sterilization phases and assist and instruct the allied science officers and men. Treatment should depend on the clinical symptoms, animal and egg inoculations, serology, cultures, and autopsy findings, and will consist of appropriate supportive and chemotherapeutic measures as well as the psychologic measures to allay panic.

BOOK REVIEW

Bacterial and Virus Diseases: Antisera, Toxoids, Vaccines, and Tuberculins in Prophylaxis and Treatment, by *H. J. Parish,* M. D., F. R. C. P. E., D. P. H., Clinical Research Director, Wellcome Foundation Ltd.; formerly Bacteriologist, Wellcome Research Laboratories. 2d edition. 204 pages; illustrated. The Williams and Wilkins Co., Baltimore, Md., publishers, 1951. Price $2.50.

The title of this small book is somewhat misleading, because it deals exclusively with the agents used for producing active and passive immunity to infectious disease and their methods of administration. It also covers antivenoms and antigens that are used primarily in diagnosis. This useful book combines in one place material that is scattered in standard texts on medicine and bacteriology. It is clearly written. The section on antisera is excellent, but some of the other subjects are less adequately covered. Although many references are given, both general and specific, these are not complete enough to permit this book to be used as a source of reference material. Although the author has attempted to cover American as well as British practice, in many instances differences are not pointed out, including procedures used by the Armed Forces.—*Capt. W. Franklin, MC, A. U. S.*

ARTICLES BY PERSONNEL OF THE MEDICAL SERVICES OF THE ARMED FORCES PUBLISHED IN OTHER JOURNALS

Forsee, J. H., Col., MC, U. S. A.: Forward surgery of severely wounded. South. Surgeon 17: 508-526, June 1951.

Forsee, J. H., Col., MC, U. S. A.; Kylar, S. L., Maj., MC, U. S. A.; and Blake, H. A., Maj., MC, U. S. A.: Pulmonary function in traumatic hemothorax treated by decortication. J. Thoracic Surg. 22: 35-44, July 1951.

Forsee, J. H., Col., MC, U. S. A.; Tempel, C. W., Col., MC, U. S. A.; and Salyer, J. M., Lt. Col., MC, U. S. A.: Recent advances in pulmonary resection in treatment of tuberculosis. Ann. Int. Med. 35: 417-431, Aug. 1951.

Hall, A. A., Col., MC, U. S. A., and Masen, J. M., Maj., MSC, U. S. A.: Test for more accurate recognition of gallbladder and liver bile during diagnostic biliary drainage. Ann. Int. Med. 35: 812-819, Oct. 1951.

James, L. A., Capt., MC, U. S. A.; Sides, L. J., Capt., MC, U. S. A.: Dye, W. E., First Lt., U. S. A. F. (MSC); and Deyke, V. F., Capt., MC, U. S. A.: Intermittent streptomycin dosage regimens; analysis of 97 cases treated with 1 and 2 grams every third day. Am. Rev. Tuberc. 63: 275-294, Mar. 1951.

Laforet, E. G., Lt., MC, U. S. N. R.; Greenler, J. J., Lt. (jg), MC, U. S. N. R.; and O'Brien, E. J., Jr.: Acute appendicitis with radiopaque appendiceal lithiasis. Am. J. Roentgenol. 65: 867-877, June 1951.

Nichols, D. H., Capt., U. S. A. F. (MC), and Postoloff, A. V.: Congenital ectopic ovary. Am. J. Obst. & Gynec. 62: 195-198, July 1951.

Nichols, D. H., Capt., U. S. A. F. (MC), and Postoloff, A. V.: Arrhenoblastoma of ovary. New York State J. Med. 51: 1847-1848, Aug. 1, 1951.

Postoloff, A. V.; Nichols, D. H., Capt., U. S. A. F. (MC); Hellriegel, J. C.; and Fronczak, E.: Primary ovarian pregnancy. New York State J. Med. 51: 1533-1534, June 15, 1951.

Rush, J. T., Lt. Col., MC, U. S. A., and Forsee, J. H., Col., MC, U. S. A.: Cushing's syndrome associated with adenoma of adrenal cortex. Mil. Surgeon 108: 319-324, Apr. 1951.

Salyer, J. M., Lt. Col., MC, U. S. A.; Forsee, J. H., Col., MC, U. S. A.; and Sawyer, K. C.: Traumatic cyst of spleen. Am. J. Surg. 81: 254-256, Feb. 1951.

Snyder, J. J., Lt. Col., MC, U. S. A.: Hypobaric spinal anesthesiology. Anesthesiology 12: 301-307, May 1951.

Tempel, C. W., Col., MC, U. S. A.; Hughes, F. J., Lt. Col., MC, U. S. A.; Mardis, R. E., Maj., MC, U. S. A.; Towbin, M. N., Capt., MC, U. S. A.; and Dye, W. E., First Lt., U. S. A. F. (MSC): Combined intermittent regimens employing streptomycin and para-aminosalicylic acid in treatment of pulmonary tuberculosis; comparison with daily and intermittent dosage schedules. Am. Rev. Tuberc. 63: 295-311. Mar. 1951.

The Orthopedist in Above-the-Knee Amputations

Lawrence E. Abt, *Ph. D.* (1)

Aaron Stern, *M. A.* (1)

AS A RESULT of an intensive research program which has sought to investigate the factors involved in prosthetic design, fit, use, and adjustment, many crucial problems have been considered and raised concerning the role of the orthopedist in affording maximum treatment to the above-the-knee amputee. It was the intention of our group to investigate the surgical technics, postamputation healing practices, limb-fitting considerations, clinical personality findings, and consultation practices with the limb-making industry revealed by a representative sample of orthopedists as expressed through the medium of a questionnaire.

Under the original contract between the Department of the Navy, Special Devices Center, Office of Naval Research and New York University, the Research Division of the College of Engineering was called on to design a biomechanical knee for inclusion in a leg prosthesis. Gradually, as the scope of the project broadened and the engineers became sensitized to new methods of studying their problem, the importance of studying the person who wears the prosthetic device forced itself on their attention. What they had originally considered as a complicated engineering problem emerged as an even more complicated study in *human engineering.*

In conducting research on the problems of above-the-knee amputees, we have sought information from all groups who have had experience in this field. For a full understanding of the problem, it is necessary to accumulate, interpret, and understand the opinions, attitudes, and experiences of these various groups. The initial step in this experimental approach consisted of a study dealing with the amputees themselves. In conducting this study, we distributed a questionnaire to a representative sample of 128 above-the-knee amputees, and the information was collected and reported (2). Some problems were answered and

(1) Research Division, College of Engineering, New York University.

(2) Report No. 80.07: Report of the Questionnaire Survey of 128 Above-the-Knee Amputees. Research Division, College of Engineering, New York University, New York, N. Y.

many new ones raised on the basis of this study. The second step was to accumulate corresponding information from orthopedists who have specialized in the field of above-the-knee amputations as corroboration and as aid in the further understanding of the data collected from amputees. In conducting this study, we distributed a questionnaire to a representative sample of 68 orthopedists and the information was collected and reported (3). Much valuable information was accumulated in this phase of the program. The final step in this approach was a coordinated questionnaire study accomplished with the limb-making profession. In line with our objectives, a representative sample of 69 qualified members of the limb-makers' industry was interrogated by means of a questionnaire and the data have been collected, organized, interpreted, and presented. (4).

In order to understand any diversity of opinion more completely and to isolate those areas in which there is a community of thinking, this questionnaire survey technic was adopted. It is our purpose in this report to compare the responses obtained from the amputees, limb-makers, and surgeons who participated in the studies dealing with the engineering, psychologic, medical, and limb-fitting factors involved in above-the-knee amputation. The material reviewed here is a composite of information originally collected from three interdependent studies. In this report we attempt to integrate the data which were presented in the several reports and to bring these data together by means of a series of interpretations. It is believed that these findings will be of wide interest to physicians who may have occasion in their own professional experience to work with other paramedical groups which also serve their patients.

FINDINGS

Surgeon-amputee considerations

The orthopedists indicated that in above-the-knee amputations most patients reported some mild pain, but only during the early postoperative stages of healing. This finding, however, was not substantiated by the responses obtained from the amputees, who reported pain in their stump as a result of: (1) walking or wearing the limb for a sustained period of time, (2) changes in the weather, and (3) stump rashes, resulting from irritation caused by the prosthesis. In light of these data, it is reasonable to suspect that ample opportunity may not often be provided the amputee to consult with the surgeon following the initial period of hospitalization.

Concerning the amputee's major complaints with reference to artificial limbs, the responses from the orthopedists and the amputees showed a

(3) Report No. 80.08: Report of the Questionnaire Survey of 68 Orthopedic Surgeons. Research Division, College of Engineering, New York University, New York, N. Y.

(4) Report No. 80.09: Report of the Questionnaire Study of 69 Limb-Makers and Limb-Fitters. Research Division, College of Engineering, New York University, New York, N. Y.

good deal of communality of thinking (table 1). Both groups listed inadequate knee control, improper fit, and excessive weight as being significant flaws in the prostheses available today, but the groups differed in that the amputees stressed improper alinement as constituting another significant deficiency, while the surgeons cited stump rashes and irritations. This last difference is easily understood in light of the types of experience afforded each of the two groups.

TABLE 1. *Major complaints about artificial limbs*

Complaint	Percent in each group responding		
	Amputee	Orthopedist	Limb-maker
Inadequate knee control	25	10	16
Improper fit	17	20	18
Improper alinement	13	0	10
Too heavy	17	15	5
Too noisy	8	0	0
Inadequate belt control	6	0	15
Stump pains and irritations	0	16	0
Too bulky	0	10	0

With respect to the manner in which artificial limbs can be improved, both groups advocated the development of a better system of knee control and a reduction in the weight of the prosthesis. A difference in the thinking of the amputees as compared to the orthopedists was evidenced, however, by the limb-wearers' further concern over the technics of limb alinement, while the surgeons sought wider use of the suction socket as a means for increasing the effectiveness of above-the-knee prosthetic appliances.

TABLE 2. *Factors making for efficient use of artificial limbs*

Factor	Percent in each group responding		
	Amputee	Orthopedist	Limb-maker
Psychologic factors	29	46	43
Different physiology	22	20	24
Better fit	20	9	18
Practice	10	0	0
Instruction (training)	11	7	7
Age difference	0	9	6

In accounting for the reasons why some amputees get poorer use from their prostheses than others, both groups agreed that differences in personality, physiologic make-up, and fit were the basic determining factors. Almost one of every two orthopedists who responded to this item of the questionnaire (46 percent of the responses) stressed in-

dividual psychologic differences as those that account for variations in performance with prostheses (table 2).

We generally found the attitude of the orthopedists towards the limb-making and limb-fitting industry to be much less hostile than the feelings expressed by the amputees. Although only 24 percent of the limb-wearers considered their present prosthesis as being good or excellent, 60 percent of the surgeons regarded the limbs that are usually available to the above-the-knee amputee in this manner. Further evidence for more positive feelings on the part of the orthopedist was found in his evaluations of the work of the limb-maker. Here we find that 70 percent of the surgeons considered the limb-maker and limb-fitter as doing a good or very competent job; only 56 percent of the amputees, however, regarded the work of the limb-maker as being of such quality.

The orthopedists agreed with amputees and limb-makers in regarding training as being of paramount importance in the efficient use of an artificial limb, but the surgeons offered no agreement as to what the essential ingredients of a training program should be. Ninety percent of the amputees indicated that the orthopedists had "done their best" or "tried honestly to help." This attitude contrasted sharply with the feelings expressed by the amputees towards the limb-makers.

One possible explanation concerning the direction of the amputee's hostility may be in the social status of the medical profession in our culture. The prestige of the surgeon greatly overshadows the position of the limb-maker or limb-fitter, and in expressing hostility, the amputee would find it less threatening to direct his aggression at the limb-making group whose social and professional status is less well established than that of the orthopedists.

Surgeon—limb-maker considerations

In evaluating the artificial limbs that are available to the amputee today, we found little difference in the responses of the orthopedist as compared to those obtained from the limb-makers (table 3). A majority of both groups considered the available prostheses as being either good or excellent, and only a small percent of the respondents regarded the limbs as being either poor or very poor.

TABLE 3. *Evaluations of artificial limbs*

Rating	Percent in each group responding		
	Amputee	Orthopedist	Limb-maker
Excellent	4	5	7
Good	20	55	54
Fair	52	27	25
Poor	14	12	2
Very poor	10	1	2

Only slight differences in the thinking between the two groups are noted concerning the amputee's major complaints with reference to his limb (table 1). The slightly different emphasis obtained from each of the groups in this area can be accounted for on the basis of the interest of the orthopedist as compared to that of the limb-maker, and the type of experience that each group is afforded in its contacts with the amputee.

In describing changes suggested as a means of improving the present artificial leg, there were significant variations in those listed by the limb-makers as compared to the responses obtained from the orthopedists.

The most important consideration in the area of limb-maker-orthopedist relations is the problem of cooperation. An attempt was made, in the research surveys, to evaluate the kinds of cooperation prevailing between these two groups at present and to obtain the thinking of each of the professions concerning the role which it can play in assisting the other. Concerning the question as to whether the limb-maker should be consulted by the surgeon prior to the amputation, 38 percent of the surgeons advocated this practice as an opportunity for the mutual exchange of knowledge and experience and 34 percent of the limb-makers favored preamputation consultation only in doubtful cases. Less than one-half of the groups representing the limb-making and surgical professions recommended consultation as a regular procedure prior to amputation.

Regarding the services which the surgeon can render to the limb-maker in order to simplify the problems of prosthetic fit and fabrication, 42 percent of the orthopedists suggested close cooperation through discussion, a process which would permit an exchange of ideas, technics, and information. The most common responses from the limb-makers, on the other hand, cited only the need for medical services which would provide the most efficient type of operation and postoperative healing. Only 27 percent of the limb-makers and limb-fitters considered cooperation and consultation as being an effective service which the surgeon could offer to them.

Although neither group showed as keen a regard for consultation as might be desirable, the surgeons were more interested in closer cooperation than the limb-makers. There seems to be a need, on the part of both groups, to develop a program of close cooperation which would permit the surgeon and the limb-maker to pool their resources in order to provide the amputee with the most efficient services in the areas of amputation and prosthetic fit. This would permit an incorporation of the services which the amputee should receive into a unified program. The technics of limb-fitting are closely related to the physiology of the postoperative stump, and it is only logical that these two interrelated and interdependent processes should proceed in close harmony with one another. The common concept which demands that the surgeon

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save as much of the leg as possible would be superseded by a new formula which calls for the preparation of the stump in order to fit effectively the most suitable prosthesis.

The attitude of the surgeon towards the limb-maker is exemplified by the respondents from this profession who considered only 12 percent of the limb-makers as being qualified to fit a prosthesis without medical supervision. The rest recommended that at least general surgical supervision be enforced in all cases of limb-fitting. This attitude provides another indication of the thinking exhibited by both groups, each of whom seeks the dominant position of supervisor over the other's activity, rather than the role of one engaged in a reciprocal alliance calling for aid and cooperation. Both the limb-maker and the orthopedist considered an adequate program of training as being of paramount importance in determining the level of achievement which the amputee will acquire in the use of his artificial limb, but neither group offered any significant suggestions concerning the organization of an efficient training program. There are apparently few reliable data available at this time which deal with the technics for prosthetic training.

It is interesting to note the almost perfect agreement between the limb-maker and the orthopedist in accounting for the reasons why some amputees get better use from their prostheses than others. Both groups recognized individual psychologic differences, differences in physiologic status, and differences in fit of the prosthesis as being the key factors which determine the manner in which an amputee will be able to use his appliance.

Amputee—limb-maker considerations

A comparison of the responses of the amputee with those of the limb-makers in describing the chief faults which are asserted to exist in artificial limbs revealed that both groups agreed on the relative inadequacy of present fitting technics, knee control, and alinement of prostheses, but showed a difference in emphasis concerning the importance of weight and the use of the belt suspension system (table 1).

Regarding suggested improvements for the present types of artificial limbs, we found a greater concentration of responses evidenced by the amputees. Although they did not emphasize more efficient fitting of the appliance, this issue was the most common suggestion offered by the limb-makers. During the course of conducting an inquiry among limb-makers and limb-fitters, manufacturers of many different types of prostheses were contacted. This fact helps to explain the variety of suggestions offered by this group for the improvement of artificial limbs. It is reasonable to assume that each person cooperating in the research project used the artificial leg developed by his own organization as a frame of reference for his comments about and evaluations of other prosthetic devices.

In explaining why some amputees get better use from their prostheses than others, we found great similarity in the thinking of the amputee and limb-maker (table 2). The responses of amputees and limb-makers were alike or similar with respect to (1) psychologic factors, (2) physiologic factors, (3) fit differences, and (4) practice and training. Although 97 percent of the limb-makers indicated that information is provided the amputee concerning the difficulties that are commonly experienced, only 43 percent of the amputee group indicate that they had been told how to overcome the troubles commonly experienced. This situation introduces the possibility that the limb-maker is not using adequate means for conveying the information to the amputee or suggests that he may offer only descriptive information concerning the troubles encountered with artificial legs without providing suitable suggestions concerning the manner in which these obstacles can be overcome.

Both groups attached great importance to the development of an efficient training program, indicating that this process is of paramount importance in determining the skill with which an amputee can use his prosthesis. The amputee and the limb-maker considered the training programs now being conducted as ineffective, owing to a lack of sufficient time available for the learning experience. Neither group offered any concrete suggestions, however, for the development of a more useful training program.

The attitude of the amputee toward the limb-maker showed much hostility. Thirty-six percent of the limb-wearers implied that the limb-maker was not adequately trained for his job, and most of the group rate the limb-maker or limb-fitter as being only fairly efficient. The attitude of the limb-maker towards the amputee, on the other hand, was a positive one, in which he indicated that the amputee was generally helpful in the execution of his task.

Amputee—surgeon—limb-maker considerations

The data which were made available as a result of these questionnaire surveys make it possible to develop direct comparisons among the responses obtained from the amputee, the limb-maker, and the orthopedist in a number of areas. All three groups offered information concerning the limb-wearer's major complaints with reference to his artificial leg, and these varied from group to group in accordance with the interests of the group and the type of contacts which its members experienced in working with prosthetic appliances and amputees. In comparing the data, we found that each group emphasized different areas in citing the chief complaints of the amputee.

In the fact that the limb-maker and orthopedist were not in agreement with the amputee is a suggestion that there is incomplete understanding on the part of the two groups concerning the problems of the limb-wearer. That the limb-maker and orthopedist disagreed with each other

is an indication that these two groups are not working from the same point of view and are approaching the problem from different interests. Such different orientation to a given situation is a desirable relationship, but only if the various points of origin eventually come together at a common focal point to the advantage of the patient.

Concerning the question of improvements in the present artificial leg, we found greater agreement in the thinking of the three groups (table 4). All three groups were consistent in their belief that a reduction in the weight of the prosthesis and improvement of the knee mechanics in the direction of greater control would be highly desirable.

TABLE 4. *Improvements suggested for artificial limbs*

Suggestion	Percent in each group responding		
	Amputee	Orthopedist	Limb-maker
Better knee control	40	19	9
Better fit	0	10	7
Better alinement	13	0	9
Reduction in weight	17	22	14
Better foot joint	15	0	0
Better instruction	6	0	0
Better maintenance	9	0	0
Use of suction socket	0	19	0
Less bulky harness	0	10	0

The area which demonstrated a marked community of thinking on the part of the amputee, the limb-maker, and the orthopedic surgeon was found in response to the question of why some amputees get better use from their prostheses than others. Here we found that all of the three groups participating in our research stressed in the same order of importance: (1) individual psychologic differences, (2) individual physiologic differences, and (3) differences in the fit of the prosthesis.

The only other problem for which we could draw direct comparisons concerning the responses of the three participating groups dealt with the matter of training in the use of the prosthesis. For the amputee, the limb-maker, and the orthopedist formal training was regarded as being a vital phase of the process of learning to use a prosthesis efficiently, and one about which little information was being offered, and for which practically no significant suggestions could be provided at this time.

CONCLUSIONS

There have been trends in our data which indicate that the amputee, the limb-maker, and the orthopedist have been acting independently on the problems of prosthetic servicing and fit, and that each has not

coordinated his services with the other in an attempt to provide the greatest good for the greatest number. If this research has done nothing more than to point out the need for closer cooperation among the persons surveyed, then we may regard it as having made a significant contribution to the problems involved in prosthetic services.

There appears to be a marked need for the limb-making industry to develop its relationships with amputees. The amputee at present doubts the ability of the limb-maker, attacks his policies as being mercenary, and does not consider his skills as operating at their most efficient level. Such discord as evidenced by the amputees' attitude towards the limb-making profession certainly seems to indicate a need for the limb-maker to promote a campaign designed to investigate the case of the present relationship, if it does truly exist, and also to develop a better understanding between the limb-making and limb-wearing groups. There can be little measure of success if the situation is permitted to continue with misconceptions of the problems involved in prosthetic services by these two groups who must work so closely together.

From the data provided by surveys, there can be little doubt that the training program is a vital phase in the process of efficient application and adjustment to a prosthesis. It is a phase, however, about which relatively little is known. The question of training can well be the subject for a separate program of research.

This study represents only a small beginning to the entire problem of organizing and pooling the thinking of the amputee, the limb-maker, and the orthopedist. It is evident, however, from the little evidence that we have assembled that there is an immediate need for further studies of the type of thinking and activities which prevail in each of these groups which are so intimately concerned with the processes of amputation and limb-fitting.

BOOK REVIEW

Gynecologic Cancer, by *James A. Corscaden,* Ph. B., M. D., Professor Emeritus of Clinical Gynecology, College of Physicians and Surgeons, Columbia University; Attending Gynecologist, Sloane Hospital for Women, New York, N. Y. Thomas Nelson & Sons, New York, N. Y. publisher, 1951. Price $6.

This book is an excellent and comprehensive monograph on cancer in the female reproductive organs. The introduction stresses the frequency of this condition and points out that the accessibility of these structures favors the application of diagnostic procedures so that diagnosis can be made in the early stages of the disease, when cure is possible in a high percentage of patients. All known procedures used

in diagnosis are described in detail and evaluated. The author stresses that in any case of abnormal uterine bleeding, the diagnosis must be established before treatment of any sort is instituted. The place of the smear technic in diagnosis is definitely delineated and the necessity for confirmatory evidence by biopsy and curettage is stressed.

Cancer of the cervix is exhaustively dealt with, the significance of the controversial carcinoma in situ is described, and the necessity for giving it a separate classification is explained. All known methods of therapy are described in detail, including the various technics of irradiation therapy. The advantages and disadvantages of the different types of treatment are described, and an evaluation of radical surgery is presented, together with a summary of results, complications, mortality, and morbidity resulting from both surgical and irradiation therapy.

The frequency of adenocarcinoma of the uterus in women who have had abnormal bleeding near the menopause is pointed out, together with the necessity for diagnostic curettage in all such patients if the disease is to be diagnosed in a curable stage. The best results in the treatment of carcinoma of the uterus have been obtained by a combination of radiation and surgical therapy. The author recommends from 5,000 to 7,000 mg.-hours of radium (which is more than is generally used) and points out that there is room for great improvement in radiation technics.

The chapters on chorion carcinoma, carcinoma of the tube, and ovarian neoplasm are concise and well written and constitute an excellent review of these subjects. One chapter is devoted to the management of the cancer patient and covers the entire gamut of available aids in palliative therapy with an evaluation of each procedure. This excellent chapter should be read by anyone who treats gynecologic cancer.

The author states that gynecologic cancer cure rates can be elevated from the present values of from 20 to 25 percent to from 85 to 90 percent with treatment technics now available, provided early diagnosis is made and proper treatment carried out. The bibliographies at the end of each chapter are complete and most, if not all, important references are listed. The book is well arranged, excellently written, printed on high-quality paper, and is well illustrated.

—*Lt. Col. E. N. Akers, MC, U. S. A.*

Dental Service in Korea

Robert H. Marlette, *Captain, DC, U. S. A.*

JOINING the 24th Medical Battalion on 9 January 1951, I was fortunate enough to be attached immediately to the highly regarded 5th regimental combat team as the regimental dental surgeon. The dental health of the command became my responsibility: a duty which I realized should not be considered lightly. To many of the young men recently graduated from shining laboratories of the dental schools, an introduction into Army field life may well come as a rude shock. The operation of an efficient, well-organized dental clinic 3 miles behind the fluctuating front lines may seem at first glance an impossibility. My purpose in this article is to clarify a possible misconception and through the experience gained in practicing dentistry under the rigorous conditions of combat, to disseminate the methods and means of our operations in the field.

Equipped with a complete dental field chest No. 60, and with the aid of a capable dental technician, I was given a command tent in which to establish the clinic. At infrequent intervals during the bitter winter we worked in Korean huts, but with the onset of the typhus season we were able to make use of our tents. This gave us an enclosed, rainproof, working space measuring about 16 by 6 ft., with the usual black-out entrance. A sterilizing table and a cabinet for the packing and storing of large-sized stock bottles were desired. We borrowed an empty medical chest, which opened out into a table with two compartments below for storage. We operated our portable gasoline sterilizer from this chest along with our needle and suture tray containing a 70 percent solution of alcohol, and a scrub pan with a solution containing 10 percent acetone, 40 percent alcohol, 50 percent water, and a trace of a proprietary antiseptic. For all operations, selected instruments were boiled for 10 minutes while the anesthetic was taking effect. Between patients, contaminated instruments were scrubbed in the germicide, then boiled again before being wrapped in a clean towel, and replaced in the dental chest. Our Korean helper maintained a constant change of halazone-treated hot water from 5-gallon drums for our scrubbing technic. A work bench for the use of the technician was constructed by using a 4-foot plank supported on 2 boxes. The mixing of amalgam, cement, temporary filling materials, and the maintenance of the dental register was performed on this table. Fortunately, the motor pool of the company was

supplied with a 3 kw. generator. Thus we were able to take full advantage of an available source of current. Borrowing light cord, light fixtures, and assorted wiring equipment from other units and sections, we rigged a droplight over the chair and made connections for the one-third horsepower motor attached to the drill and the included Burton spot lamp. Good amalgam work during the dark winter days was greatly facilitated by the use of the resultant high-speed drill and consequent excellent illumination.

In order to become familiar with the dental health of the command, I held dental sick call each morning and routine operative appointments were conducted in the afternoon. After operating in this manner for 1 month, I made an analysis of the sick and wounded report for the month and decided to institute a regimental dental survey as soon as the regiment was ordered into reserve. This decision was based on the fact that: (1) 12 percent of the dental patients seen were held over in the collecting station for extensive treatment resulting from dental defects which were obviously beyond repair; (2) without early diagnosis and treatment, each patient on whom an extraction was performed had to be considered a potential evacuee; and (3) routine dental care had to be offered to each regimental unit on an equitable basis, compatible with the size of the unit, number and type of cases within the unit, tactical developments, and with co-ordination of the transportation, sleeping, and feeding problems encountered between the patient and the collecting station.

As the battalions moved into an assembly area, the survey was conducted by the simple expedient of moving into the company bivouac area and checking the men in the food lines, rifle inspections, shower groups, and similar company or platoon formations. The immediate purpose was to determine the number, type, and location of men needing immediate extractions and to establish a record of the number of patients needing treatment. On the basis of this data, it was possible to inaugurate a systematic method of treating the patients needing restorations and partial dentures. After completion of the survey the results were sent through command channels to the various company commanders and certain days of the week were designated for patients requiring dental care to report to the collecting station, the tactical situation permitting.

At first it was expected that the frequent rebilleting of the collection station with consequent stripping and reassembling of our equipment would necessarily limit the dental service. The necessity for treating routine dental conditions while the troops were in combat also presented itself. We believed that the treatment of a minor toothache should be postponed under the pressure of tactical developments. In order to compensate for probable limiting factors, 2 methods of rendering advanced dental service to the line battalions were devised. Using the available medical technician's first-aid pouch, I packed my dental emergency kit, which contained a complete set of extraction instruments, medicaments for treating oral infection, pericoronitis, gingivitis, and

moderate forms of periodontal disease along with instruments for incising and draining abscesses. On the march, while in convoys, and while our collecting station was being assembled I was able to offer almost any type of emergency treatment from this kit. When the battalions were dug-in, or in a more or less static offensive position, I was able to take my surgical kit up to the battalion aid stations and hold a dental sick call, after first notifying the battalion medical officers to inform the line companies that dental problems could be treated at the aid station. This method of examination and treatment reduced the number of patients who had to be evacuated from the battalion aid stations for dental reasons. It also helped to eliminate those few neurotic dental patients who habitually reported to the collecting station for unnecessary treatment, taking time that should have been devoted to men who were in more acute need of restorations and operative dentistry and who could be more easily, and efficiently treated with the aid of the dental unit.

Working in the field with a combat unit I had not only to consider the tooth and associated structures, but to become cognizant of other extrinsic factors, such as the relationship of the soldier and his unit, the relative value of each to his duty, and the possible consequences of any extended treatment or evacuation. It was rapidly becoming apparent in this police action that the mental attitude of the average soldier differed from that of participants in World War II.

The incidence of acute oral infection was surprisingly low, considering the conditions under which the men had to fight and live: Food to the fighting men often meant soft "C" rations, with drinking water limited to 1/4 canteen per day. Toothbrushes, when available served the more vital purpose of cleaning the trigger housing of the rifles. The resistance of the oral tissues to disease was very low; but over a 3-month period the rate of oral infection, despite these conditions, was negligible. Factors contributing to this included (1) strict indoctrination in oral hygiene, (2) individual canteens, and (3) the high standards of cleanliness of the field kitchens. The alcohol intake by the individual soldier decreased markedly, thus preventing any localized decrease in the pH of the oral tissues. The vitamin C level was augmented by the inclusion of large quantities of fruit juices in the menus. Possibly the most important factor was the use of the antibiotics in the routine treatments of the many specific infections which were treated at the collecting station. A patient admitted for treatment, who might have any type of infection, was usually given a course of penicillin which effectively eliminated most pathogens and at the same time probably warded off the onset of an oral infection which might otherwise have occurred.

In this as in any war, change is the essence of survival. As a consequence of the recent fluid tactical developments in the Korean campaign, orders to strip our supplies to a minimum and increase our

mobility were received. The collecting company was split into a forward and rearward station, with an ambulance run of 25 miles or more between the 2 sections. In compliance with this order our command tent was abolished, our extra equipment was eliminated, and the dental clinic was set up in the squad tent of the aid station at the rear echelon, where I worked directly from chest No. 60. Working from the aid kit and with available medical supplies, dental extractions were performed at the forward collecting station in the afternoon. Permanent restorations, and dental work for the service troops near the rearward collecting section were screened on routine sick call in the mornings. There can be no standardized method of performing dental work under combat conditions, but expedients can always be improvised which will aid in increasing the efficiency of the regiment.

SUMMARY

Following a regimental dental survey, a means of inaugurating a systematic method of treating dental conditions in the field was devised and the number of patients evacuated from the combat zone for dental reasons was reduced. This involved (1) the use of an augmented first-aid kit, (2) the judicious screening of individual cases, and (3) the elimination of patients with neurotic complaints. A surprisingly low rate of oral infection was observed. The management of a dental practice within a fighting regiment presents an interesting and challenging problem.

BOOK REVIEW

Children's Radiographic Technic, by *Forrest E. Sburtleff,* R. T., Children's Medical Center, Boston, Mass. 80 pages; illustrated. Lea & Febiger, Philadelphia, Pa., publisher, 1951. Price $3.75.

Although no attempt is made to interpret roentgenograms, the essential information for positioning and x-raying the patient is adequately described. The book contains 4 chapters which are brief and yet give all the necessary details concerning: (1) equipment and accessories, (2) children's radiographic positions, (3) special radiographic procedures, and (4) technic. The illustrations are good. The description of intravenous pyelography may be considered by some to be obsolete in that the adult technic does not give such good results in children. In recent years it has been found unnecessary to give enemas or laxatives. By administering a glass of fluid at the beginning of the procedure, the stomach is distended so that the kidneys lie behind it and can be well visualized. Careful attention to the technics described in this book will result in more exact diagnoses and conserve films.

—*Lt. Col. B. I. Copple, MC, U. S. A.*

Adenomatoid Tumor of the Epididymis

Urquhart L. Meeter, *Major, U. S. A. F. (MC)* (1)

Jack W. Schwartz, *Colonel, MC, U. S. A.* (1)

ADENOMATOID tumor of the epididymis was first reported by Sakaguchi (2) as an adenomyoma. Several articles reviewing the literature on this subject have since appeared (3-7). The terminology has been confusing and varied; these tumors having been referred to as adenoma, adenomyoma, mesothelioma, adenomatoid, angiomatoid, adenofibromyoma, lymphangio-endothelioma, adenocarcinoma, lymphangioma, mixed leiomyoma, and lymphangioma. Although the multiplicity of designations has interfered with an accurate compilation of statistics, about 81 cases have been reported, 64 of these being reported in the past 10 years. It is believed that the incidence of this tumor is not on the increase but rather that the articles mentioned have stimulated interest in benign tumors of the epididymis resulting in increased recognition of the lesion.

There has been much discussion in the literature regarding the probable germ layer of origin. Codnere and Flynn (8) pointed out that the caput major of the epididymis has several ductules derived from the cranial group of mesonephric tubules while the caudal group persists as aberrant ductules and vestigial remnants in the lower portion of the epididymis and they considered these remnants as the possible epithelial

(1) Letterman Army Hospital, San Francisco, Calif.

(2) Sakaguchi, Y.: Ueber das Adenomyom des Nebenhodens. Zschr. Path. 18: 379-387, 1916.

(3) Hinman, F., and Gibson, T. E.: Tumors of epididymis, spermatic cord and testicular tunics. Arch. Surg. 8: 100-137 (pt. 1), Jan. 1924.

(4) Thompson, G. J.: Tumors of spermatic cord, epididymis, and testicular tunics; review of literature and report of 41 additional cases. Surg., Gynec. & Obst. 62: 712-728, Apr. 1936.

(5) Evans, N.: Mesothelioma of epididymis and tunica vaginalis. J. Urol. 50: 249-254, Aug. 1943.

(6) Golden, A., and Ash, J. E.: Adenomatoid tumors of genital tract. Am. J. Path. 21: 63-79, Jan. 1945.

(7) Lee, M. J., Jr.; Dockerty, M. B.; Thompson, G. J.; and Waugh, J. M.: Benign mesotheliomas (adenomatoid tumors) of genital tract. Surg., Gynec. & Obst. 91: 221-231, Aug. 1950.

(8) Codnere, J. T., and Flynn, J. E.: Adenomatoid tumor of epididymis; report of 3 cases. J. Urol. 56: 448-453, Oct. 1946.

origin. Support is gained from the high incidence of this tumor in the globus minor. The mesothelial theory is stressed by Evans (5), backed by Lee et al. (7), who based their arguments on the proximity of the tumor to the peritoneum plus the finding of serosal communications with the neoplastic spaces in several tumors found in the uterus. The endothelial theory was championed by Morehead (9) and Davenport (10) who believed that coalescence of the vacuolated cells to form spaces mimics the embryologic formation of lymph and vascular spaces. We prefer the term "adenomatoid tumor" as proposed by Golden and Ash (6). It has the advantage of being morphologically correct but genetically neutral.

Recent reports by Wyatt and Khoo (11) and Burros and Mayock (12) made use of the term "adenomatoid." The latter article, in addition, extended the age of incidence to the newborn; the stated age grouping having previously been the third to seventh decades. Glaser (13) stated that an accurate classification is not possible as no one has really had much experience with this tumor. In conclusion, all of these authors believed that the histogenesis has not been definitely established and the possibility of settling the issue seems remote. Any possible clinical significance even if the germ layer of origin were established would appear doubtful.

CASE REPORTS

Case 1. A man, 32 years old, was admitted to this hospital in December 1946 with a history of a slowly growing nontender mass in the right scrotum of 3 years' duration. There was no history of trauma. A right epididymectomy was performed. The lesion was confined to the globus minor. Convalescence was satisfactory and a 4-year follow-up showed no evidence of recurrence.

The gross specimen consisted of an irregular mass of tissue, 5 cm. in diameter, most of which was roughly cylindrical in shape. It was covered by a shaggy gray capsule. The cut surface of this nodule was extremely firm in consistency and white in appearance. The microscopic sections showed masses and strands of dense connective tissue, partially hyalinized in some areas, separating glandlike structures. In the periphery of the lesion some smooth muscle elements were present, but none were noted within the tumor proper. The cells comprising the glandlike portion of the tumor varied in shape. In some areas these cells appeared in sheets and cords and in other places their arrange-

(9) Morehead, R. P.: Angiomatoid formations in genital organs with and without tumor formation. Arch. Path. 42: 56-63, July 1946.

(10) Davenport, H., Jr.: Adenomatoid (angiomatoid) formations of genital organs. Texas State J. Med. 43: 694 698, Mar. 1948.

(11) Wyatt, J. P., and Khoo, P. S. H: Genital tract tumours of angiomatoid nature. Brit. J. Urol. 22: 187-194, Sept. 1950.

(12) Burros, H. M., and Mayock, P. P.: Adenomatoid tumor of epididymis; report of case in newborn. J. Urol. 63: 712-713, Apr. 1950.

(13) Glaser, S.: Neoplasms of epididymis; review with report of 2 new cases. Brit. J. Urol. 22: 178-186, Sept. 1950.

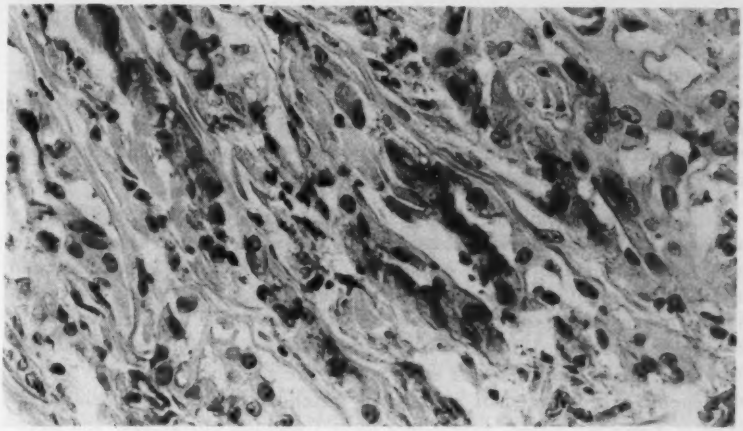

Figure 1.

ment simulated glands. In the first instance the cells were cuboidal and the cystoplasm was prominent. In the glandlike areas the cells were much flatter and only rarely was a cell with a perinuclear swelling noted. Vacuolization of the cells was a prominent feature. The glandlike areas, in general, were devoid of any contents except for an occasional desquamated cell lining these spaces. The nuclei were fairly regular in their shape and appearance, being roughly oval and moderately vesicular. Several small aggregations of lymphocytes were scattered throughout the tumor area (fig. 1). A diagnosis of adenomatoid tumor of the epididymis was made.

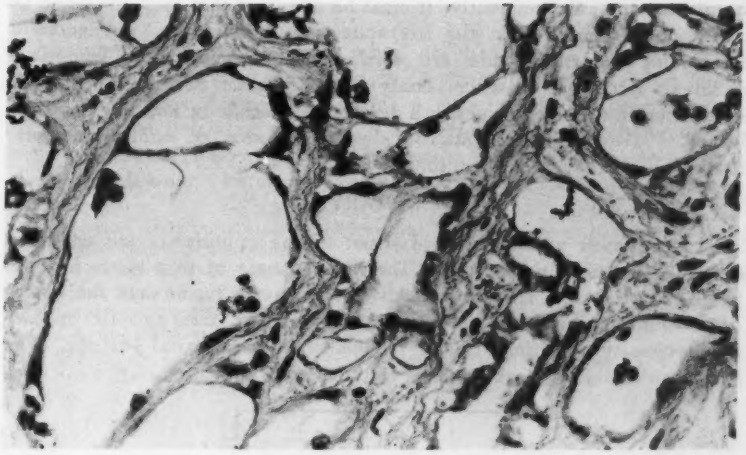

Figure 2.

Case 2. A man, 60 years old, was admitted to this hospital in October 1949 complaining of a right inguinal hernia of 5 months' duration and a painless slowly growing nodule in the right side of the scrotum of 5 years' duration. The nodule was firm, measured 2 by 2 cm., and was confined within the globus minor of the epididymis. A right epididymectomy was performed. Convalescence was uncomplicated and a 1-year follow-up showed no evidence of recurrence.

The gross specimen consisted of (1) a firm nodule measuring 2.5 by 2 by 1.7 cm. which was covered by a red-gray, smooth tissue and to which two irregular sheets of smooth, gray-pink tissue were attached and (2) two tubular structures, each about 5 cm. long. Near the termination of one of these tubular structures, there was a dilatation forming a nodule measuring 1.3 cm. in its greatest diameter. In the microscopic sections the epididymis was seen along the periphery, but the bulk of the specimen consisted of a tumor in which there were many small, irregular spaces. These were lined by a flattened epithelium and occasionally they contained lymphocytes. Small interstitial collections of lymphocytes were also noted (fig. 2). A diagnosis of adenomatoid tumor of the epididymis was made.

DISCUSSION

Adenomatoid tumors of the epididymis are benign lesions and are of clinical significance only in the differential diagnosis from other more serious lesions of the scrotal contents. Differentiation from testicular tumors, spermatocele, specific and nonspecific epididymitis, torsion, orchitis, and hydrocele is essential and should not offer too great a problem. Thompson and Davenport stated that about 40 percent of all epididymal lesions are benign tumors and most of these are adenomatoid tumors. Consequently, it must be assumed that this condition is much more common than the literature would indicate. Adenomatoid tumors of the epididymis are small, firm, asymptomatic, spherical nodules, occurring most commonly in the globus minor. They occur most often in the third to seventh decades. Trauma is not an etiologic factor. Treatment consists of simple excision or epididymectomy. Radiation therapy is not indicated.

SUMMARY

Two cases of adenomatoid tumor of the epididymis are added to about 81 previously reported. The histogenesis of this tumor has not been established. This is a much more common tumor than the literature would indicate and its clinical importance seems to lie only in the necessity of differentiating it from other intrascrotal lesions. The treatment is simple excision or epididymectomy.

ACTH in the Treatment of Postvaccinal Encephalitis

A SMALL number of cases of postvaccinal encephalitis apparently have been benefited by treatment with ACTH (1). Up to the present time no specific treatment has been available for this condition. Postvaccinal encephalitis is a rare complication of immunization against smallpox and rabies and a similar encephalitis is infrequently seen in convalescence from various viral infections. In 1947, following the vaccination of about 5 million people against smallpox, the New York City Department of Health recorded a total of 45 cases of encephalitis with 4 deaths during the 2-month period subsequent to the vaccinations (2). It was not shown that all these cases were postvaccinal encephalitis, and, hence, while the maximum possible incidence in this group was 1 per 100,000 vaccinated, the actual incidence was probably less. Other estimates of the incidence of postvaccinal encephalitis following smallpox vaccination range from 1 in 640 to 1 in 285,000 in reports from different parts of the world (2). The disease occurs more frequently after rabies immunization and Johnson (3) quoted an incidence of from 1 in 3,000 to 1 in 10,000 vaccinated. The case fatality rate is from 10 to 50 percent (4) but neurologic residues are rare.

Although the cause of postvaccinal encephalitis is obscure, certain evidence indicates that the underlying pathologic process is an isoallergic mechanism. Laboratory studies using experimental animals have indicated that cortisone and ACTH are effective in modifying or preventing the encephalomyelitis which results from the injection of brain tissue emulsions. The lesions of experimental encephalomyelitis are

(1) Personal letter from Dr. Kenneth Thompson to Major General Raymond W. Bliss, then Surgeon General, U. S. Army.

(2) Greenberg, M., and Appelbaum, E.: Postvaccinal encephalitis; report of 45 cases in New York City. Am. J. M. Sc. 216: 565-570, Nov. 1948.

(3) Johnson, H. N.: Rabies. In Rivers, T. M. (editor): Viral and Rickettsial Infections of Man. J. B. Lippincott Co., Philadelphia, Pa., 1948. ch. 9, p. 235.

(4) Olitsky, P. K., and Casals, J.: Viral encephalitides. In Rivers, T. M. (editor): Viral and Rickettsial Infections of Man. J. B. Lippincott Co., Philadelphia, Pa., 1948. ch. 8, pp. 163-208.

similar to those of postvaccinal encephalitis. Moyer et al. (5) were able to suppress the central nervous system lesions in guinea pigs by administering ACTH immediately *after* the sensitizing brain-adjuvant mixture was given. Kabat et al. (6) prevented the sensitization of monkeys by giving cortisone *before* and immediately *after* vaccination.

Before any conclusion as to the efficacy of treatment with ACTH or cortisone in postvaccinal encephalitis is warranted, further evaluation is indicated. Nevertheless, hope for definitive therapy would seem to be offered in what has previously been a therapeutically barren field.

(5) Moyer, A. W.; Jervis, G. A.; Black, J.; Koprowski, H.; and Cox, H. R.: Action of adrenocorticotropic hormone (ACTH) in experimental allergic encephalomyelitis of guinea pig. Proc. Soc. Exper. Biol. & Med. 75: 387-390, Nov. 1950.

(6) Kabat, E. A.; Wolf, A.; and Bezer, A. E.: Effect of cortisone on experimental acute disseminated encephalomyelitis. Federation Proc. 10: 412, Mar. 1951.

BOOK REVIEW

Electroencephalography in Clinical Practice, by *Robert S. Schwab,* M. D., Director of the Brain Wave Laboratory, Massachusetts General Hospital, and Associate in Neurology, Harvard Medical School. 195 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publisher, 1951.

"The true worth of (the electroencephalogram) to clinical problems lies in the closest correlative effort in obtaining all the facts, not only electroencephalographic, but also clinical and other laboratory data about each patient, and building up the final interpretation from them." The basic value of the procedure is dependent on the amount of aid it can give to the referring clinician in diagnosis leading ultimately to better and earlier treatment. The author in this well-written treatise succeeds in affording the clinician not intimately acquainted with the EEG a basis for the use of this technic. The book is not an atlas or a profound treatise on neurophysiology, of value only as a reference volume, but is a practical aid to the busy clinician. A brief historical summary and a short chapter outlining some important basic neurophysiologic theories and dicta are included. The various degrees of normality and abnormality are discussed, and chapters describe the EEG in epilepsy, in other neurologic and neurosurgical entities and in psychiatry. The chapter on technic and laboratory organization go into some detail on the problems of obtaining and interpreting the records. At the end of each chapter is a short but pertinent bibliography. There is a glossary and an adequate index. This volume should be useful to the internist, neuropsychiatrist, and neurosurgeon.

—*Lt. Comdr. R. G. Berry, MC, U. S. N.*

A Study of the Unsuitable Person

Maxwell G. Potter, *Lieutenant, MC, U. S. N.* (1)

THE service psychiatrist's duty frequently involves the culling and eventual separation from the service of men whose personalities make them unsuitable for retention. That these men are detrimental to the service is unquestioned. Their resentment of authority, inability to carry out orders satisfactorily, impulsive actions, and frequent episodes of bizarre behavior tend to be prejudicial to the maintenance of good discipline in the service, to foment unrest in their fellows, and to arouse hostility in their superiors. In addition, their inadaptability and undependability lessens their value, not only in time of emergency, but also in their routine duties. The general ineptness of their performance of duty does not justify the time spent in training them. Much time is lost in the many days these men spend either in a disciplinary status, or on the sick list. Furthermore a small number of such men can reduce the general efficiency of a well-organized, highly mobile tactical unit, such as a ship. These personality problems seem to be lifelong in duration, and it is believed that psychobiographic search would reveal previous evidences of their reacting to situations in much the same fashion as they have reacted to those within the Navy, and that a longitudinal study would reveal previous evidences of socio-psychologic discordance with the environment as well as interpersonal conflict.

In this article such a study is reported. No attempt was made to elicit dynamics, but rather to note any common developmental trends and situations. At the time this study was carried out, certain adventitious facets, which would ordinarily complicate the study of service maladjustment were absent. Many of the patients studied originally entered the Armed Forces via selective service, but all had re-enlisted at the end of their involuntary tour of duty. Hence, they were all in the service by their own choice, and there was no resentment or discontentment at being drafted from a more satisfactory civilian situation. Also, at the time these men were interviewed, there was no thought of the Korean conflict. Indeed, the last man was surveyed from the service 4 days prior to the invasion by the North Koreans.

(1) U. S. Naval Hospital, Portsmouth, Va.

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The service offers an excellent backdrop for the peacetime study of personality conflicts. There is a parental-surrogate relationship with the officers, a pseudo-sibling relationship with the shipmates, and a moderately easy economic situation. This tends to throw interpersonal conflict into bold relief.

A temporal span was selected for study rather than a definite number of patients, and a 6-month period was thought to be most apt to yield meaningful statistical results, without being unwieldy. The 174 patients appearing before a Board of Medical Survey from 1 January to 1 July 1950 were taken for study. They were selected from an admission group for the same period, totaling 504 patients. The established diagnoses are shown in table 1. According to the Joint Armed Forces Statistical Classification and Basic Diagnostic Nomenclature, schizoid personalities and emotional instability reactions are considered evidence of pathologic personality types, while all of the other neuropsychiatric diagnoses represent immature personalities. No attempt has been made to treat each personality group individually, but rather to handle them as a unit, because of the relatively close relationship of all developmental factors.

TABLE 1. *Diagnoses made and established*

Schizoid personality	77
Passive dependent reaction	64
Passive aggressive reaction	11
Emotional instability reaction	11
Immaturity with symptomatic habit reaction:	
Enuresis	6
Somnambulism	3
Speech disorder	2
Total	174

The hospital stay of the patients studied averaged 33.5 days. Eighty-three percent of the patients fell in the fifth or sixth; 14 percent in the fourth; and 3 percent in the third pay grade. Twenty patients were Marines, 1 was in the Army, and 1 was a Wave; the rest were all naval enlisted men. The age distribution of the patients was: 17 to 20 years, 64.9 percent; 21 to 24 years, 24.3 percent; 25 to 28 years, 9.1 percent; and 29 to 34 years, 1.7 percent. The breakdown of time in service showed that 8.2 percent had spent less than 6 months in service; 9.4 percent, 6 to 11 months; 18.9 percent, 12 to 17 months; 16.7 percent, 18 to 23 months; 24.6 percent, 24 to 35 months; 13.1 percent, 36 to 59 months; and 9.1 percent, 5 to 8 years.

In view of the fact that this is a longitudinal study, the information is presented from the time of birth through admission to the hospital.

Homes. The essential elements of the early development of the patients are shown in table 2. Of the 62 patients from broken homes, the breaks occurred before the patients were 15 years of age in 57; of the 38 patients whose parents were divorced, the divorce occurred before the patient was 10 years of age in 30. Thus, familial integrity in these instances was destroyed prior to the time when the patients would begin to feel the moderate security of adolescence. Three of the patients were raised in orphanages.

TABLE 2. *Essential elements of early development*

Type of home:	
Broken homes	62
Death (24)	
Divorce (38)	
Discordant homes	26
Economically marginal homes	12
Stepparents	32
Position in family:	
Oldest	32
Youngest	39
Next to oldest	14
Next to youngest	19
Middle	34
Only	31
Twin	2
Undetermined	3
Total	174
Sibling relationship:	
Discordant	27
Envy of others	8
Indifferent	5
Childhood neurotic traits:	
Severe	34
Moderately severe	51
Mild	60
None	29
Total	174

Parents. Forty patients described their mothers as neurotic, while another 22 described them as over-protective. Hypochondriacal mothers were reported by 18; 2 were alcoholic; and 5 were adulterous. Thirty fathers, on the other hand, were described as strict, 27 as alcoholic, 11 as rejecting, 11 as disinterested, and 8 as extremely punitive. In addition, ambivalence toward the parents was expressed by 24 patients, with overt hatred toward the father by 11, and toward the mother by 3. In 42 there was definite evidence of overdependence on the mother. Of the 32 with stepparents, 5 expressed hatred for their stepfathers, and 2 for their stepmothers. Ambivalent feelings were noted toward 3 stepparents.

Although the average number of siblings in the homes of these patients was 3.3, the average for the patients with schizoid personality

was 4.5. Polarity seemed to be the most common position in the family in that 58.6 percent of the patients were either the oldest, youngest, or only child. The fact of being an only child was noted more often in the passive dependent group, and less frequently in the schizoid group; thus, it would seem that the schizoid personality tended to develop in the larger family group where the patient was less apt to get attention by being either the oldest or the youngest. This lack of significance in the family group was thought to be a predominant factor.

TABLE 3. *School adjustment*

Grade attained (average)	10.2
Age at which attendance was discontinued	16.1
Motivation:	
Poor	76
Fair	50
Good	48
Total	174
Relationship to authority:	
Poor	44
Fair	64
Good	66
Total	174
Reasons for leaving school:	
Graduated	54
To work	51
No apparent reason	40
Failed	8
To enter service	11
Expelled	10
Total	174

Childhood neurotic traits. It is difficult to assess the full significance of a childhood neurotic trait, yet the patients were able to give definite evidences of such traits being present. From time to time, it was necessary to consider that some traits were more important than others, and that 1 predominant severe trait might be more significant in a given patient than 5 or 6 in another. As a general rule, however, 2 such traits were considered mild; 3 or 4 moderately severe; and more than 4 severe. The traits most commonly noted were: anxiety, enuresis, nail-biting, temper tantrums, phobias, sleepwalking, odd behavior, lying, and stealing. Anxiety was the most difficult to assess, dependent as we were on the patient's recollection of the degree of severity of "nervousness" in his childhood. There were only 12 patients in whom severe physical illness was present in childhood.

School history. The school adjustment and reasons for leaving school are shown in table 3. The school background was selected as the first major area in which interpersonal relations and relation to authority other than parents were active. Of the 174 patients studied, only 7 went to college, and none of them stayed beyond the first year. It is

also of interest that 40 of the patients were unable to state why they left school before they graduated.

Work record. Sixty-four patients held no job before entering the service. These include the 54 who were enrolled immediately on graduating from high school. Forty-one of the others had a stable work record. There were 15 who held more than one job, but performed good work on those jobs. Fifty-four, however, showed a grossly poor work adjustment. That is to say, they were unable to adjust to their employers, were unable to carry out their duties satisfactorily, and, in many instances, lost their jobs because of their inadequacy.

Reasons for joining the service are shown in table 4. Although the most frequent reason given by these patients was to escape an unpleasant home situation; this same reason is implicit in those who wished to travel, to see something different, to think things over, those who wanted experience, and those who had nothing else to do. It is probable that those who joined to learn a trade or for educational purposes, and who were subsequently frustrated in this aim, were overly influenced by recruiting posters.

TABLE 4. *Reasons for enlistment*

To get away from home	50
To "see something different" or to travel	30
"Nothing else to do"	20
To learn a trade or for education	16
Unable to find a job	14
To avoid being drafted into the Army	11
To think things over and to get experience	11
No ostensible reason	7
Because friends or brothers joined	6
To escape an unpleasant situation	5
Undetermined	4
Total	174

Naval adjustment. Aboard ship, 78 of these patients made a good adjustment with their shipmates, whereas 96 did not. Of this latter group, 79 stated that they avoided their shipmates as much as possible, because of disliking their teasing, their generally rough conduct, or their too frequent aggressive episodes. Nine stated that their culture differed from that of the other men aboard ship and that their shipmates were too vulgar. Most of this group complained about the use of foul language and unpleasant habits on liberty; 8 complained that they were "too close to their shipmates." This latter factor seemed related to latent homosexual trends within the individual man. Only 73 had a satisfactory relationship with their officers. The rest required frequent disciplinary action. It was impossible to evaluate adequately the de-

gree of disciplinary action that each of these men received, but at least 80 of them had received 1 captain's mast. Those who had not received some disciplinary action indicated their maladjustment by their rejection of the fashion in which they felt they were being treated by their officers. A large group of them stated that they had no respect for their officers.

TABLE 5. *Presenting symptoms on admission*

Anxiety	57
Free-floating	(35)
Headache	(22)
Confusion and odd behavior	12
Hostility against Navy	12
Frequent disciplinary action	10
Gradual withdrawal	10
Vertigo	10
Suicidal attempts	9
Excessive drinking	7
Syncope	6
Enuresis	6
Insomnia	5
Administrative admissions	5
Depression	5
Fear of homosexuality	4
Hyperventilation	3
Excessive masturbation	3
Homesickness	3
Seasickness	3
Speech disorders	2
Somnambulism	2
Total	174

Sexual background. Of the patients studied, 78 had made an adult heterosexual adjustment. In addition, 17 were married, and, according to their own statement, happily. Twenty-nine exhibited definite evidence of latent homosexuality. Five had had overt homosexual relationships at one time or another. An additional 45 had made a heterosexual adjustment, but on an immature level, and their attitude toward any sexual adjustment was definitely of an immature type. The frequency of masturbation among these patients could not be tabulated accurately, but in view of the fact that their age span was one in which masturbation might easily be present, no significance was attached to it, except in those instances where it seemed to be the predominating cause for admission. Of the group, including those who had showed both heterosexual activities and latent homosexuality, promiscuity was noted in 51. This was again difficult to assess because, although masturbation would probably be denied by the majority of these patients, promiscuity might be and often was one sphere in which exaggeration (or boasting) took place.

The cause for admission. The admission complaints have been listed in table 5. Although 57 of the patients exhibited definite symptoms of anxiety, many of the symptoms listed as the cause for admis-

sion such as hyperventilation, insomnia, homesickness, seasickness, syncope, and excessive drinking were as indicative of anxiety as headaches. Suicidal attempts, confused and bizarre behavior, and enuresis indicate more deep-seated conflict than simple anxiety. The anxiety of whatever type was thought to be present because these patients could only adjust with total personality reactions and when this defense began to fail, as with any other mechanism of ego defense, anxiety was released.

Although most of our patients were admitted from their own activity, 38 were transferred from other hospital services. As 16 patients were originally on the orthopedic service, it is possible that the majority of them may have been influenced by extensive hospitalization, but it is more likely that they were put in a situation where they could be observed more closely by medical officers and, as a result, their behavior problems were noted. Certain of the original causes for admissions to other wards were of a neuropsychiatric nature with somatization.

DISCUSSION

Either neurotic traits or neurotigenic factors were at work in most of these patients. In no area was this so obvious as in the motivating factors for enlisting. The largest number admitted that they were escaping an intolerable home situation. A smaller number were looking for excitement, adventure, or "something different." Further investigation revealed that many of these men were also escaping, or seeking to escape. Some waited until they finished school; others could not wait, but left at once. The situations which were deserted were essentially those of excessive rigidity. Hence, we cannot be surprised that the symptoms of personality maladjustment did not improve, in view of the fact that they were entering a situation little different from the one that they had left, as regards rigidity. The group with poor work records were attempting to escape their difficulties in the work role, but only succeeded in bringing their own maladjustment with them. The question of what part the Navy played in worsening the personality pattern of these men arises. It has been possible to note a deleterious effect in only 10 percent of the patients seen. These men reacted to Navy life in the same way as they had reacted to the former life status—with certain fixed patterns of behavior, which were satisfactory for adjustment as long as no tension was produced, or no environmental reactions occurred. A large number of these men carried with them into the Navy a rather glamorized vision of Navy life, of the "raging foam," and "girl in every port" variety. This group all reported disenchantment.

The ideal approach would be to determine whether or not these men could be identified and isolated at their time of enlistment in the Navy, thus saving the cost of training, maintaining them in the hospital, and then surveying them, which entails the use of doctors, corpsmen, nurses, and clerical workers. The difficulty lies, unfortunately, in

there being no simple way of ferreting out these personality disorders. Such things as enuresis, sleepwalking, and speech disorders can be found, usually by simple interrogation, provided the man isn't so eager to enlist that he will falsify the facts, but if a man's problem consists of acting out certain conflicts, he can only be detected by being in the situation where such behavior is necessary. Psychologic testing can show us that such trends exist, but it cannot tell us that such behavior will ensue. Nor does a history of traumatic episodes and immature behavior indicate that such behavior will necessarily follow, as we recognize that there are others with such backgrounds who are socially productive. For such a determination there is no single method. Nonetheless, intensive study at the time of enlistment should be carried out in the hope that the entry of a certain number can be blocked.

Once the man has entered the service, early recognition of such personality defects seems to be the best maneuver. It is significant that no less than 32 percent of the patients studied had more than 1 psychiatric admission, and 10 percent more than 2. Multiple admissions seem to entail, in most instances, reduplication of previous study, thus depriving other patients of the medical officers' attention. More intensive therapy at the time of the first admission, with an eye toward the patient's better understanding the problem, would be preferable to trying to rekindle motivation by reassurance.

A training center where men could perform limited duty, with duty more suited to their personalities, while undergoing therapy has been suggested, but such a plan would be practical and necessary only during a full mobilization. At present, the best plan seems to be more careful psychiatric scrutiny at the time of induction.

BOOK REVIEW

Manual Therapy, by *James B. Mennell,* M. A., M. D., B. C. (Cantab.), Consulting Physician in Physical Medicine, St. Thomas's Hospital; Vice-President and Hon. Fellow, Chartered Society of Physiotherapy, London, England; Gold Key of the American Congress of Physical Medicine; Gold Key of the American Physical Therapy Association; Honorary Life Member of the Netherlands Physical Therapy Association. 64 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.25.

This practical manual on physical manipulations by a noted British authority in physical therapy discusses various phases of massage, movements, and joint manipulation. The author points out contradictions and errors as well as benefits of physical therapy. This book is a handy guide to physical therapists, orthopedists, and technicians.

—*Col. F. W. Pruitt, MC, U. S. A.*

Aureomycin Therapy for Ambulatory Patients[1]

Lester H. Roth, *Lieutenant, junior grade, DC, U. S. N. R.* [2]

WHEN it is necessary to maintain adequate blood serum and salivary levels of antibiotics in the treatment of oral conditions, aureomycin provides a rapid and efficient means of therapy. Oral administration of aureomycin, therefore, is ideally suited for ambulatory military personnel. Some past disadvantages of antibiotic therapy have been: (1) the necessity for parenteral administration; (2) insufficient antibacterial spectrum; (3) development of resistant organisms; (4) side reactions; (5) insufficient factor of safety; and (6) need for trained technical personnel.

The available forms of aureomycin provide the dental officer with enough variation in technics [3] to treat a wide variety of dental disorders with comparative ease of manipulation and a minimum of armamentarium. The low incidence of side reactions resulting from the use of these various forms of aureomycin are of particular advantage in the treatment of most cases of oral infection [4]. Preoperative medication can be made with ambulatory patients by administering aureomycin in capsule form. A high blood level can be obtained effectively with oral administration. Oral prophylaxis against secondary infection before and after dental extractions can be approached successfully by the administration of troches and irrigating solutions. Although parenteral administration may be used when necessary, an effective response is obtained by oral administration.

Among those patients expected to have postoperative complications following dental operations, the use of aureomycin has resulted in a marked reduction in the incidence of swelling, pain, sloughing, dis-

[1] From the Research Department of the School of Dentistry, University of Pittsburgh. Aureomycin for this study was furnished by the manufacturer.

[2] School of Dentistry, University of Pittsburgh, Pittsburgh, Pa.

[3] Roth, L. H.: Table of suggested therapy with aureomycin hydrochloride, crystalline, in dentistry. Pennsylvania Dent. J. 18: 100-102, Apr. 1951.

[4] Roth, L. H.: Observations and significance of side reactions during treatment of oral conditions with oral aureomycin. West Virginia Dent. J. 25: 4: 123, Apr. 1951.

TABLE 1. *Suggested doses of aureomycin for common oral infections*

Condition	Form	Suggested dose	Average time required for initial relief (hours)
Acute gingivitis	Troche (15 mg.)	15 mg. q. 2 hr. for 20 doses	24
Chronic gingivitis	Troche (15 mg.)	15 mg. q. 3 hr. for 15 doses	12-24
Necrotic gingivitis	1% solution	2 cc.*	24-48
Vincent's angina	Capsule (250 mg.)	250 mg. q. 5 hr. for 16 doses	12
	Troche (15 mg.)	15 mg. q. 2 hr. for 16 doses	
Suppurative gingivitis	Capsule (250 mg.)	250 mg. q. 5 hr. for 10 doses	30-36
	1% solution	2 cc.**	
Acute suppurative alveoloclasia	1% solution	2 cc. twice daily**	24
Periodontal pockets	1% solution	2 cc.**	
	Dental cones (5 mg.)	1 per treatment area p. r. n.	24
	3% paste	Applied freely to pocket and pressure packed p. r. n.	
Putrescent pulp	0.5% solution	Irrigation of involved area	48-72
Acute periapical abscess	Capsule (250 mg.)	250 mg. q. 5 hr. for 8 doses	24
Preoperative prophylaxis	Capsule (250 mg.)	250 mg. q. 6 hr. for 8 doses	------
Odontectomy	3% paste	Applied to resultant socket as spherical mass 1/4 inch in diameter	24
Herpes simplex	1% ointment	Applied freely to lesion	48-72
Aphthous stomatitis	Troche (15 mg.)	15 mg. q. 2 hr. for 12 doses	24-48
Affections of the tongue	Troche (15 mg.)	15 mg. q. 2 hr. for 6 doses	12-36
Affection of the oral mucosa and soft tissues	Capsule (250 mg.)	250 mg. q. 5 hr. for 12 doses	24-72
	1% solution as wet dressings	Frequent application to area	------

*Applied subgingivally or throughout the mouth when indicated.
**Applied well under the detached tissue by means of hypodermic syringe and deposited slowly.

agreeable odor, delayed healing, and other complications (5,6). Disturbing and painful gingival conditions, as well as soft tissue lacerations, respond promptly to aureomycin treatment. This is of special significance to military personnel as it facilitates treatment while the patient is still engaged in general duty. Areas of chronic or acute suppuration in the oral cavity can be treated and brought to a successful termination by irrigation of the tissue flap, pocket, or abscess with

(5) Roth, L. H.: New York State Dent. J. In press.
(6) Roth, L. H.: Aureomycin in overcoming oral odors. West Virginia Dent. J. 25: 98, Jan. 1951.

a prepared solution of aureomycin (5). Routine administration of aureomycin paste applied postoperatively the resultant socket following extraction lowers the incidence of secondary infection, postoperative pain, delayed healing, and other untoward sequelas (5). Suggested doses are shown in table 1.

BOOK REVIEW

Practical Clinical Psychiatry, by *Edward A. Strecker,* A. B., A. M., ScD., Litt.D., LL.D., M. D., Professor of Psychiatry, School of Medicine, University of Pennsylvania, *Franklin G. Ebaugh,* A. B., M. D., Professor of Psychiatry, University of Colorado, School of Medicine; Director, Colorado Psychopathic Hospital, *Jack R. Ewalt,* M. D., Professor of Neuro-Psychiatry; Administrator of Hospitals, University of Texas Medical Branch, Galveston, Tex. Section of Psychopathologic Problems of Childhood, by *Leo Kanner,* M. D., Associate Professor of Psychiatry, Johns Hopkins University School of Medicine. 7th edition. 506 pages; illustrated. The Blakiston Company, Philadelphia, Pa., publisher, 1951. Price $7.

As the senior author writes in the preface of this latest edition of a text which has enjoyed long popularity among medical students, general practitioners, and psychiatrists,"* * * every physician needs to learn the lessons of psychiatry, if he is to be a complete doctor." In line with a growing appreciation of this fact among members of the medical profession as a whole, this edition, to a greater extent than previous ones, places more emphasis on the role nonpsychiatrists can play in understanding and treating the emotional aspects of every patient's illness. To chapter 11 a section has been added on the "somatization reactions," a category of disorders already familiar to most military physicians. In addition, an entirely new chapter entitled "Support Psychotherapy" has been included. Many chapters have been rewritten and improved. In general there is more explicit acknowledgement of the indebtedness of psychiatry and medical psychology to Sigmund Freud and his followers in psychoanalysis. At the same time there has been preserved the best of Adolf Meyer, and all the other American and European psychiatrists who have made important contributions to a broader understanding of man in sickness and in health. Some may be surprised that the term "Constitutional Psychopathic Inferior" is retained as a chapter title when so much that is implicit in the entire book points to that category as a shrinking and increasingly unimportant one. There is a bibliography following each chapter and a general index at the end of the book.—*Lt. Col. W. J. Barker, MC, U. S. A.*

BOOK REVIEW

Proceedings of the Third International Congress of the International Society of Hematology, Cambridge, England, August 21-25, 1950. Editorial Committee: *Carl V. Moore,* U. S. A., Editor-in-Chief; *L. Berman,* U. S. A.; *J. Bernard,* France; *S. Haberman,* U. S. A.; *J. Hill,* U. S. A.; *H. Ludin,* Switzerland; *R. MacFarland,* U. K.; *S. Mettier,* U. S. A.; *R. Race,* U. K.; *E. Storti,* Italy. 593 pages; illustrated. Grune & Stratton, New York, N. Y., publisher, 1951. Price: Cloth bound $10; Paper bound $8.

This volume, bound in pyroxylin-impregnated, water-repellent cloth, illustrated in black and white only, contains 176 chapters which represent a collection of papers on similar topics written by clinicians, pathologists, clinical pathologists, biochemists, physiologists, immunologists, geneticists, microbiologists, and anatomists. It, therefore, makes the general subject of hematology current for the student, specialists, and general practitioner. A complete summary of each article is given in English with the exception of 29 which are either in French or German. There are also occasional exceptions in which only the title is listed or a brief summary of content is made.

The first division consisting of 54 chapters covers the anemias and related subjects adequately. The isolation, properties, pathogenesis, action, and effects of vitamins are well discussed. The subject of hemolytic diseases is well presented. Several chapters are devoted to hypersplenism in the tropics and related experimental studies. The second division consisting of 25 articles on immunohematology thoroughly brings one up to date on the subject of the agglutinins, agglutinoids, antibodies, antiglobulin reactions, and the spectrum of all known blood antibodies including the Duffy, Kell-Cellano, and the Rh antibodies. The third division consists of 50 articles on leukemia and related diseases, subdivided according to etiology, pathogenesis, histochemical and morphologic studies, clinical considerations and classifications, and therapeutic approaches. The fourth and last division consists of 47 articles on coagulation, purpura and related diseases, and miscellaneous subjects. Although many of these contain highly technical information for the specialist alone, there is sufficient variation in content to bring all concerned up to date in trends of research, clinical observations, and clinical trials.

This book summarizes present-day trends of thought from all over the world regarding experimental and practical hematology, and the material is presented in such a way as to be of interest to teacher, student, clinician, and researcher.—*Col. J. M. Blumberg, MC, U. S. A.*

Vasa Praevia

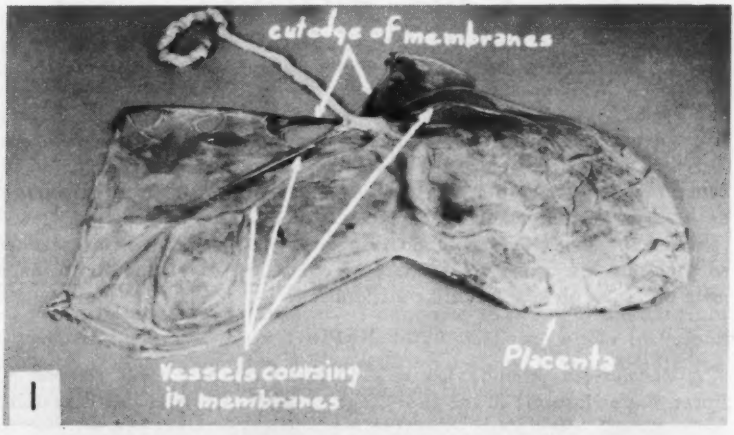
Irving A. Beychok, *Captain, U. S. A. F. (MC)*

THE 3 usual causes of bleeding in the third trimester of pregnancy are cervical lesions, abruptio placenta, and placenta praevia. Bleeding of the cervix is generally important only in the sense that it must be distinguished from the more dangerous hemorrhages of a prematurely separated placenta or one that is implanted low in the uterus. The following report of a case of vasa praevia is presented to illustrate a fourth cause of late bleeding, the diagnosis and management of which present peculiar difficulties.

CASE REPORT

A 21-year-old primigravida was admitted to the Ernest Harmon Air Force Base Hospital in the first stage of labor. Her prenatal course had been normal. Her blood pressure on admission was 130/80 and her pulse was 84. The size of the abdomen as well as the menstrual history indicated a term fetus whose head was well engaged in the pelvis. Uterine contractions lasted 45 seconds and occurred at regular 4-minute intervals. About 1 hour after admission, following the usual perineal preparation and enema, the nurse noted a moderate amount of fresh bleeding from the vagina, which had not been present on admission. No pain was associated with the bleeding, and the uterus was not tender to palpation. The fetal heart tones rapidly deteriorated and for a few minutes were inaudible. The patient's blood was immediately typed and cross-matched and dextrose solution was given intravenously. A rectal examination cautiously performed revealed the vertex to be in the occiput right anterior position at station zero, and the cervix to be dilated 4 cm. and 75 percent effaced. A bulging amnion was palpated. The condition was diagnosed as a probable mild abruptio placentae. A 500 cc. whole blood transfusion and oxygen by mask were administered in an attempt to alleviate the fetal distress. The fetal heart tones improved, a fact which falsely strengthened the diagnosis. Labor was allowed to progress unaided for 3 more hours, after which the fetal heart tones again became irregular and faint. At this point a sterile vaginal examination was performed. The amnion was tense, and bridged by what was adjudged to be several tough, fibrous bands. Inasmuch as dilation of the cervix was still incomplete and had progressed slowly, the membranes were ruptured between these "bands." Labor was greatly facilitated, but about 20 minutes later the fetal heart tones disappeared and

were not heard again at any time. In another 20 minutes, a low forceps delivery under low-spinal anesthesia was accomplished, but the infant was stillborn and all attempts at revival failed. Not until the placenta was delivered was the true condition suspected.



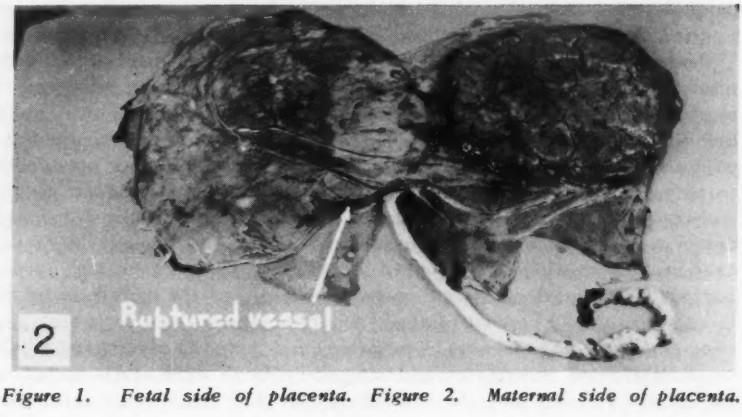


Figure 1. Fetal side of placenta. Figure 2. Maternal side of placenta.

COMMENT

As can be seen in figures 1 and 2 there was a velamentous insertion of the cord. The "bands" noted on vaginal examination were small arborizations of the umbilical vessels, one of which had ruptured during labor. This condition is known as vasa praevia, and is one of the gross placental abnormalities recently reviewed in a paper by Donnerly *(1)*.

(1) Donnerly, G. C.: Gross abnormalities of placenta associated with bleeding in pregnancy. Am. J. Obst. & Gynec. 61: 910-913, Apr. 1951.

In this condition the bleeding is fetal rather than maternal, and blood transfusion is probably of little value. The condition has been mistaken in other instances for placenta praevia (2). DeLee (3) gave the incidence of velamentous insertion as from 0.4 to 1.25 percent and stated that it is 9 times more common in twins than with single fetuses and is almost the rule with triplets. He believed the velamentous insertion to be dangerous only when the vessels in the membranes traverse the lower uterine segment (vasa praevia). The fetus may be lost either because of compression of the velamentous vessels during the passage of the head or as a result of tearing of one or more of the vessels when the membranes rupture.

Among the clues to the diagnosis are: (1) a slight but continuous hemorrhage during labor, (2) the absence of pain, militating against abruptio placentae, and (3) rapid, weak fetal heart tones, especially after rupture of membranes. In some instances the diagnosis may be made before the membranes rupture because the pulsating vessels may be felt coursing over the amnion. When the pregnancy is multiple, the condition should be suspected immediately. In the case here reported, bleeding occurred before the membranes were artifically ruptured, probably as a result of tearing of one of the vessels by the increased pressure attendant on the uterine contractions.

In the treatment of those patients in whom the diagnosis is made before the membranes have been ruptured (as when pulsating vessels are felt in the amnion), the most important point is that every possible precaution must be taken to prevent rupture of the membranes before dilatation of the cervix is complete and the infant can be delivered without delay. To this end a soft elastic colpeurynter may be placed in the vagina and the patient kept in the elevated Sim's position. When the cervix is fully dilated, the membranes are artifically ruptured between the vessels and delivery effected as rapidly as is consistent with maternal safety.

If the diagnosis is not made until the membranes have ruptured spontaneously, it is incumbent on the physician to follow whatever course of action will lead to the most rapid delivery of the infant. Considering the length of time generally required to prepare for and perform a cesarian section, it is doubtful that this would often be the most rapid way to effect delivery.

CONCLUSIONS

Mild, persistent bleeding beginning in labor, especially after rupture of membranes, and more especially in multiple pregnancies strongly suggests vasa praevia. The cardinal point in treatment is to delay, if possible, the rupture of the membranes until the cervix is fully effaced and rapid delivery is possible.

(2) Vogt, W. H., Jr.: Vasa previa. Am. J. Obst. & Gynec. 45: 1044-1046, June 1943.
(3) DeLee, J. B., and Greenhill, J. P.: The Principles and Practice of Obstetrics. 9th edition. W. B. Saunders Co., Philadelphia, Pa., 1947.

BOOK REVIEW

An Atlas of Anatomy, by *J. C. Boileau Grant,* M. C., M. B., Ch.B., F. R. C. S. (Edin.), Professor of Anatomy in the University of Toronto. By Regions: Upper Limb, Abdomen, Perineum, Pelvis, Lower Limb, Vertebrae, Vertebral Column, Thorax, Head and Neck, Cranial Nerves and Dermatomes. 3d edition. 637 plates. The Williams and Wilkins Co., Baltimore, Md., publishers, 1951.

Because accumulated knowledge of anatomic structures remains more or less static from year to year the printing of a new edition of an atlas of anatomy may seem redundant. Nevertheless, when substantial improvements in pictorial portrayal of anatomic knowledge have been achieved, as in this work, a new edition is indeed worthwhile. This atlas was published first in 1943, and a second edition appeared in 1947. The third edition, published in 1951, is a more comprehensive revision and embraces several improvements in illustrative technic which enhance clarity. Twenty-eight of the old illustrations have been replaced or improved, and more than 70 new illustrations have been added. Refreshing simplicity has been accomplished by avoiding exhaustive descriptions and by plainly marking and labeling the illustrations serially with large numerals and appropriate titles. The pages are not numbered but each *figure* is numbered consectively. An excellent index refers to the figure numbers of the illustrations containing the indexed items.

The atlas is well bound in one large volume with sections on the upper limb, abdomen, perineum and pelvis, lower limb, vertebras and vertebral column, thorax, head and neck, and cranial nerves and dermatomes. The illustrations are beautifully executed in a manner which portrays the anatomic structures and relationships clearly and accurately. The various components of each illustration are well labeled. Concise but ample descriptions of the illustrated subjects are included. The nomenclature used is the Birmingham Revision of the Basle Nomina Anatomica. Both terms are employed where in some instances, the revised and unrevised terms are substantially different. Both terms also are to be found in the index. Throughout the atlas color is used liberally but judiciously to emphasize and differentiate anatomic structures. This volume was prepared with meticulous care, so as to insure accuracy, exclude superfluous matter, achieve clarity, and maintain simplicity. It is highly recommended for students of anatomy and should be received with enthusiasm by surgeons.

—*Col. J. R. Darnall, MC, U. S. A.*

Self-Administration of Mercaptomerin Sodium

Byron E. Pollock, *Colonel, MC, U. S. A.* (1)

James O. Gillespie, *Brigadier General, MC, U. S. A.* (1)

KREHBIEL and Stewart (2) have recently reported the successful use of a mercurial diuretic, mercaptomerin sodium (thiomerin), by patients trained to administer the drug subcutaneously to themselves. Our purpose in this article is to confirm the findings of the above authors and to present our experience with this method in 12 patients treated with mercaptomerin sodium, self-administered subcutaneously over periods of from 2 weeks to 8 months.

On 4 October 1950 a patient with hypertensive cardiovascular disease was re-admitted to this hospital in severe congestive heart failure for the third time. Cardiac decompensation had occurred while he was taking adequate maintenance doses of digitalis and was maintaining a satisfactory low-salt diet. During both previous admissions this patient had responded well to the use of mercurial diuretics but had been unable to attend the clinic at frequent intervals for follow-up care after discharge because of economic pressure and the distance from his home to the hospital. He was placed in a bed next to that of a diabetic patient. The thought occurred to us at that time that he could administer mercaptomerin sodium to himself in the same way that the diabetic patient administered his own insulin. On such a regimen his weight fell from 145 to 123 pounds within 1 week, after which his weight was maintained by the injection of 1 cc. of mercaptomerin sodium every second day. He was discharged from the hospital and seen in the cardiac clinic at intervals of from 1 to 4 weeks. He has since been able to maintain cardiac compensation with no difficulty except for one period in March 1951 when he exhausted his supply of the drug and was without it for 10 days (case 1, table 1).

(1) Letterman Army Hospital, San Francisco, Calif.

(2) Krehbiel, S., and Stewart, H. J.: Self-administration of mercurial diuretic; experience of patients with mercaptomerin (thiomerin) sodium. J. A. M. A. 146: 250-253, May 19, 1951.

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TABLE 1. *Data on 12 patients treated with mercaptomerin sodium by self-administration*

Case	Age (years)	Diagnosis	Date use of mercaptomerin sodium begun	Number of injections to June 1951	Body weight in pounds		Comments
					Before use of drug	After use of drug	
1	52	Hypertensive cardiovascular disease. Auricular fibrillation.	4 October 1950	80	145	123	Cardiac compensation maintained except for 2 periods of treatment lapse.
2	60	Rheumatic mitral stenosis.	10 October 1950	43	183	175	Cardiac compensation restored and maintained. Patient works full time. Moderate cardiac reserve.
3	51	Arteriosclerotic heart disease. Old myocardial infarction.	17 November 1950	15	165	159	Diuretic discontinued 5 January 1951. No longer necessary.
4	82	Arteriosclerotic and hypertensive heart disease; bronchogenic carcinoma.	8 December 1950	93	146	124	Good cardiac compensation. Several small, mildly tender nodules developed at injection sites.
5	75	Arteriosclerotic heart disease. Old myocardial infarction.	15 December 1950	34	146	134	Two recurrences of congestive failure on patient's discontinuance of regime. Patient died 3 March 1951 from a new myocardial infarction.
6	53	Malignant hypertension, postsympathectomy.	21 December 1950	50	174	173	Change from intravenous to subcutaneous route with satisfactory objective results. Reverted to intravenous use 19 April 1951.
7	54	Arteriosclerotic heart disease; old posterior myocardial infarction with anginal syndrome.	6 January 1951	131	147	134	Cardiac compensation maintained; angina improved.

TABLE 1. *Data on 12 patients treated with mercaptomerin sodium by self-administration*—Continued

Case	Age (years)	Diagnosis	Date use of mercaptomerin sodium begun	Number of injections to June 1951	Body weight in pounds		Comments
					Before use of drug	After use of drug	
8	50	Hypertensive and arteriosclerotic heart disease; old anteroseptal myocardial infarction.	12 January 1951	20	138	127	Died from new anterolateral myocardial infarction on 26 March 1951. Diagnoisis confirmed by autopsy.
9	46	Malignant hypertension, postsympathectomy.	24 January 1951	24+	148	140	Compensation maintained. Low cardiac reserve. Patient left hospital area to live elsewhere. Was still on self-administered mercaptomerin on 15 March 1951.
10	70	Arteriosclerotic and hypertensive heart disease.	25 January 1951	10	116	106	Emotionally unable to inject self often enough. Undependable in maintenance of weight chart and appointments. Method discontinued.
11	64	Arteriosclerotic heart disease. Old myocardial infarction,	6 February 1951	57	207	198	Compensation maintained. No reactions.
12	36	Rheumatic mitral stenosis, post-commissurotomy.	10 April 1951	4	107	100	Patient left hospital 24 April 1951 to live in another city.

A program for the use of self-administered mercaptomerin sodium (3) dating from the time of the above-mentioned patient, was planned on a clinical basis. Whenever a patient presented himself either in the hospital or in the cardiac clinic in need of long-term mercurial diuretic medication he was added to the study. Subcutaneous injections of mercaptomerin sodium were given by a physician the first 2 times and on the third occasion by the patient in the presence of the physician. With this background of training, patients were able to continue their own medication without difficulty. The anterior surface of the thigh was chosen as the most readily available site for injection. The usual dose employed was 1 cc. Patients were instructed to maintain a daily record of body weight. The time interval between injections was specified by the physician at the time of the clinic visit and adjusted from time to time as indicated by the patient's weight chart. Although some patients required daily injections for short periods, the average interval was every other day to twice a week.

RESULTS

Mercaptomerin sodium has been self-administered by 12 patients with chronic heart disease. The data are summarized in table 1. Excellent results in maintenance of cardiac compensation were obtained in 10 patients. One patient (case 12), was not under observation long enough to evaluate the method and in another (case 10) the attempt to use this method of administration had to be abandoned because of poor cooperation of the patient. Four illustrative cases are reported below.

CASE REPORTS

Case 2. A 60-year-old man with rheumatic cardiovascular disease and marked mitral stenosis had been placed on digitalis therapy in 1939 because of congestive heart failure. Auricular fibrillation had been present for many years. He entered the hospital on 23 May 1950 for the fifth time in congestive heart failure. Compensation was restored by the addition of a low-salt diet and daily injections of a mercurial diuretic. He was discharged to clinic care on 12 June 1950, but was unable to maintain complete cardiac compensation through occasional intravenous injections of mercurial diuretics and the daily use of oral mercurial diuretic tablets. On 10 October 1950 he was placed on the program of self-administration of mercaptomerin sodium. Since that time he has been able to maintain compensation while working for from 8 to 12 hours a day. He has felt well enough to undertake additional work responsibilities and has married. Examination in May 1951 revealed no evidence of cardiac decompensation.

Case 3. A 49-year-old soldier was admitted to this hospital on 14 May 1949 with a history of anterior myocardial infarction in December

(3) Initial supplies of Thiomerin (mercaptomerin sodium) were provided by the manufacturer.

1937 with recurrent congestive heart failure on 2 occasions following return to limited duty, despite the use of digitalis and a low-salt diet. On admission there was marked anasarca. The signs of severe congestive heart failure and of tricuspid insufficiency were present. The ECG revealed right ventricular hypertrophy. The use of a low-salt diet and administration of digitalis and mercurial diuretic drugs to the maximum amount tolerated clinically led to recompensation and loss of tricuspid insufficiency, and the patient was retired from the Army. On 17 November a schedule of intravenous injections of a mercurial diuretic was superseded by the program of self-administration of mercaptomerin sodium. The patient's weight was reduced during the first week from 165 to 160 pounds and thereafter was maintained at a relatively constant level by the administration of the drug. This patient required an injection twice weekly during the first 2 weeks and thereafter he was able to extend the interval between injections gradually so that 1 month later he was taking only 1 injection per week. On 5 January 1951 he took his last injection of a mercurial diuretic in view of the fact that no weight increase developed thereafter and he manifested no evidence of congestive heart failure. He continued to take maintenance doses of digitalis and to use a low-salt diet. In February 1951, he began working full time as a guard at an industrial plant and has continued to do so with excellent cardiac compensation and satisfactory cardiac reserve.

Case 5. A 75-year-old man with arteriosclerotic cardiovascular disease was released from this hospital in February 1950 following myocardial infarction with congestive heart failure. Maintenance doses of digitalis, a low-salt diet, and the use of oral mercurial diuretic tablets proved inadequate to maintain cardiac compensation so that parenteral injections of mercurial diuretics were initiated on 13 April 1950. On 15 December, because of inadequate control of congestive failure with weekly injections of intravenous mercurials at the cardiac clinic, he was placed on self-administered mercaptomerin sodium given every second day. In the following week he lost 10 pounds; the edema of the ankles decreased from 3 plus to 1 plus; indigestion and shortness of breath were relieved; and his mental alertness improved. He gained and maintained good cardiac compensation. During rehospitalization of the patient in February 1951, because of influenza, he maintained compensation without diuretic medication. After discharge, however, the signs of congestive heart failure reappeared and and were again controlled by self-administered mercaptomerin sodium. He died on 3 March from a new myocardial infarction.

Case 11. A 64-year-old man began to have attacks of angina pectoris in 1947. In 1949 auricular fibrillation developed and was controlled by digitalization. Following a period of excessive use of alcohol, he was admitted to this hospital on 10 September 1950, in congestive heart failure. Cardiac compensation was restored through the use of

a low-salt diet, vitamin supplements, and digitalis. Auricular fibrillation converted spontaneously to normal rhythm. On discharge from the hospital he was followed in the cardiac clinic and maintained compensation well until 6 February 1951 at which time he was again found to be in congestive heart failure. A brief period of hospitalization again restored cardiac compensation and he was discharged on the program of self-administration of mercaptomerin sodium on 16 February. He has been able to maintain a relatively constant weight with an average of 3 injections of the drug per week and the use of a low-salt diet, and was well compensated in May 1951. He has had no untoward symptoms since the introduction of mercaptomerin therapy except for 1 brief period of anorexia attributable to overdosage of digitalis.

The salt depletion syndrome *(4)* was not encountered in any of these patients either by clinical manifestations or laboratory findings. Local reactions to subcutaneous injections occurred in only 1 patient (case 4) and consisted of small nodule formation at the site of injections which persisted for several weeks. These nodules were mildly tender for only the first few days. This reaction was not severe enough to deter the patient from continuing the method. Local infection at the site of injection was not encountered.

DISCUSSION

Mercaptomerin sodium, now a standard item of supply, has been shown to be a safe and effective diuretic when administered subcutaneously *(2, 5-7)*. This characteristic renders it suitable for self-injection by patients with chronic heart disease who require a mercurial diuretic in addition to the other drugs and supportive measures in common use for maintenance of cardiac compensation. Through supervision the physician should assure himself that the patient has mastered the technic of self-injection. Clinic visits at weekly to monthly intervals should be scheduled on an individual basis, with more frequent visits early in the program. If a patient is initially placed on self-administration of mercaptomerin sodium while in the hospital, the cardiac compensation thus secured can be well maintained provided cooperationof the patient continues after his discharge. Initial studies of renal function, instructions to the patient to report the development of weakness, and periodic checks of the serum sodium level should suffice to prevent a low-salt reaction *(7)*.

The two deaths occurring in this series were caused by new infarctions of the myocardium in patients with severe coronary arterioscle-

(4) Schroeder, H. A.: Renal failure associated with low extracellular sodium chloride; low salt syndrome. J. A. M. A. 141: 117-124, Sept. 10, 1949.

(5) Herrmann, G. R.: Myocardial insufficiency; mechanism and management with data on new and safer mercurial diuretic. J. A. M. A. 140: 509-513, June 11, 1949.

(6) Stewart, H. J., et al.: Experience with thiomerin; a new mercurial diuretic. Circulation 1: 502-507, Apr. 1950.

(7) Grossman, J., et al.: Studies on thiomerin; subcutaneously administerable diuretic. Circulation 1: 508-515, Apr. 1950.

rosis who had been maintained in cardiac compensation. Such deaths are reasonably attributable to the natural course of the disease and are not chargeable to therapy with a diuretic drug.

The self-administration of mercaptomerin sodium relieves the patient of the necessity for frequent clinic visits, and enables him to maintain an even state of compensation without frequent accumulations of fluid followed by excessive diureses. This method also reduces the demands on the time of the clinic personnel.

SUMMARY

Twelve patients have given themselves injections of mercaptomerin sodium over a period varying from 2 weeks to 8 months. These patients were suffering from chronic arteriosclerotic, hypertensive, or rheumatic heart disease, and required the use of a mercurial diuretic to maintain adequate cardiac compensation. Data regarding these patients is tabulated and more detailed accounts of 5 of them are given. Self-administration of the drug was acceptable to 11 of them, and safely maintained cardiac compensation. Reactions to the medication occurred in 1 patient and were limited to local nodule formation. This program benefited the patients by reducing the number of clinic visits required and by maintaining level cardiac compensation. Fewer visits by these patients likewise relieved the clinic personnel of routine work. These results confirm the recent report of Krehbiel and Stewart (2) and suggest the desirability of widespread adoption of this method of treatment.

BOOK REVIEW

Clinical Pediatric Urology, by *Meredith Campbell,* M. S., M. D., F. A. C. S., Professor of Urology, New York University Post-Graduate Medical School; Visiting Urologist, Bellevue and University Hospitals, New York, With a Section on Nephritis and Allied Diseases in Infancy and Childhood, by *Elvira Goettsch,* A. B., M. D., Associate Professor of Pediatrics, University of Southern California School of Medicine; and Assistant Medical Director of The Children's Hospital Society of Los Angeles, and *John D. Lyttle,* A. B., M. D., Late Professor of Pediatrics, University of Southern California School of Medicine; and Medical Director of The Children's Hospital Society of Los Angeles. 1,113 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1951.

The author of this long-needed text is one of the world's leading authorities on urology in infants and children. His 30 odd years of experience with the urologic problems of childhood, in one of the world's largest metropolitan areas, and his close associations with pathologists, pediatricians, and other clinicians in that area has given him a rich background from which he has drawn the material for this volume. As he reminds us, much of the advancement in handling urologic problems

in infants and children comes from the revelation of an unsuspected high incidence of urinary anomalies by excretory urography. Furthermore, continued perfection of miniature urologic instruments for diagnosis and treatment of urologic conditions in infants and children exactly as in adults has hastened this advancement.

This book covers all of the problems likely to be encountered in the handling of urogenital diseases in infants and children. A section on nephritis and allied diseases in infancy and childhood, written by two leading pediatric professors, as well as a chapter on pediatric urologic nursing, is included. The order and presentation of subject matter varies little from that of most urologic texts, but, abundant space has been given to conditions most prevalent in the early years of life, such as anomalies of the urogenital tract, and such complications as urinary infections and tumors. Scant space has been given other conditions, such as prostatic diseases, not frequently encountered in children. Likewise the large section on operative procedures highlights the commonest procedures required in urologic operations on children.

Methods of examination and diagnosis in infants and children differ from those in adults. Though identical etiologic agents and pathologic conditions are present in each, the manifestations differ in children. These differences are adequately emphasized throughout the book.

The section on embryology and anomalies is invaluable. It is comprehensive yet concise. The reader is never allowed to lose sight of the clinical aspects of these anomalies, and how likely they are to be responsible for urinary tract obstruction and infection. A large section is devoted to urinary infections, tuberculosis and otherwise. Here again the difference from these conditions in adults lies not in the etiology and pathology, but in the manifestations, differential diagnostic methods, and modes of administration of therapeutic agents. Modern concepts in regard to renal calculi are discussed. In the section on the male genital tract and the female urethra, infections, endocrine problems, and conditions requiring corrective operations, are thoroughly covered.

One of the best discussions of kidney tumors available is found in the section on tumors. Likewise the chapter on the adrenal glands, with the latest concepts of the clinical significance of the steroids, is well worth study. For the most part the illustrations are excellent. This volume is extremely valuable as a text primarily for urologists but should be of interest to pediatricians as well.

—*Col. R. T. Artman, MC, U. S. A.*

The Surgical Importance of Schoenlein-Henoch Disease[1]

Edward T. Gordon, *Captain, MC, U. S. A.*

THE LITERATURE is replete with description of Schoenlein-Henoch disease. The syndrome is usually easily recognized and diagnosed. Its relationship to allergy is widely accepted (2). The diagnostic triad consists of a characteristic exanthem which is not necessarily purpuric, gastrointestinal symptoms, and joint manifestations. In the absence of cutaneous manifestations, the visceral involvement at times offers a perplexing diagnostic problem. These symptoms and signs often suggest an acute surgical condition of the abdomen. That this condition is not rare is apparent from our experience at this hospital. Two cases were observed in 1 year among 2,539 hospital admissions. They illustrate the difficulty of diagnosis when the cutaneous signs are absent.

CASE REPORTS

Case 1. A soldier was admitted to the surgical service of this hospital on 5 April 1950 complaining of abdominal pain and a skin rash. He had been well until 2 April, when he noticed a generalized pruritic rash. He was treated with benadryl and in 24 hours the pruritus was markedly improved. On the morning of admission he was awakened by dull, colicky, periumbilical pain associated with anorexia and nausea. An hour later the pain disappeared spontaneously, but a residual soreness remained. No history of previous episodes of abdominal pain, allergy, or serious illnesses was obtained.

Physical examination revealed a temperature of 99.4° F., a pulse of 84, and a respiratory rate of 22. A generalized urticaria, most marked on the flexor surfaces of the extremities, was present. There was guarding in the right lower quadrant of the abdomen, but no spasm or rigidity. Rebound tenderness was present throughout the abdomen. The peristaltic sounds were normal. Rectal examination elicited tenderness on

(1) 7th Station Hospital, Trieste.

(2) Hampton, S. F.: Henoch's purpura based on food allergy; report of 2 cases. J. Allergy 12: 579-591, Sept. 1941.

the right side. The leukocyte counts ranged from 10,250 on the day of admission to 7,700 with normal differential counts in the course of the next 5 days.

The patient was given 50 mg. of benadryl q.i.d., with almost complete disappearance of the rash by 10 April, the day of discharge. Twenty-four hours later he was readmitted with soreness in both knees and the right ankle and blue blotches over his legs.

Physical examination on this admission revealed purpuric lesions scattered over the lower extremities. On the right buttock an erythematous papular eruption was present which was pruritic. Hydrathrosis of the left knee and tenderness about the patella were present. Tenderness was elicited on palpation of the lateral aspect of the right ankle. Laboratory tests including blood counts, bleeding and clotting times, platelet counts, and sedimentation rate were all within normal limits. The cuff test was negative. The microscopic examination of one urine specimen showed an occasional red blood cell. The stool was negative for occult blood. The ECG was normal. Symptomatic therapy was instituted and by the fifth hospital day the joint symptoms and the purpura had subsided.

Comment. The presence of cutaneous manifestations with gastrointestinal symptoms offered no diagnostic problem. The response to antihistaminic drugs was prompt but did not prevent progression of the disease.

Case 2. A soldier, 21 years of age, was admitted to the medical service on 12 January 1951 complaining of crampy lower abdominal pain of 4 days' duration. He stated the illness had begun on 8 January when he experienced lower abdominal colic associated with constipation. A self-administered cathartic afforded no relief. Two days before admission, anorexia, nausea, and vomiting developed. A complete blood count and urinalysis on 9 January were within normal limits. One day before admission, a cathartic produced some relief of his symptoms. On the day of admission the abdominal pain reappeared after he drank some liquids. The patient described his pain as continuous, colicky, and so severe as to cause him to writhe in agony. It was in the midline below the umbilicus and was associated with nausea, vomiting, and the passage of flatus. The patient had had an appendectomy in 1946 for pain of a similar nature. During the second postoperative week he had had a recurrence of the pain, and had been advised that it was probably "gas pain." After about a month this disappeared. His mother had had hay fever.

Physical examination revealed a well-developed young man in acute distress. No physical findings in the abdomen were present to account for the severe pain. The leukocyte count was 8,850 with a normal differential count. The diagnoses entertained on admission were obstruction of the small bowel, intussusception, and gastroenteritis.

The abdominal pain persisted and was controlled only with large doses of meperidine hydrochloride. Parenteral fluids were given. On the second hospital day 200 cc. of bright red blood was passed by rectum. At this time he vomited green blood-flecked material. The abdominal findings remained negative; the temperature remained normal; and urinalysis revealed an occasional red blood cell and from 2 to 3 leukocytes per low power field. The leukocyte count had risen to 11,650 with 54 percent polymorphonuclear cells, 36 percent lymphocytes, 4 percent monocytes, and 6 percent eosinophils. A flat x-ray plate of the abdomen showed no abnormalities. An intravenous pyelogram was normal. The continuous severe abdominal colic associated with melena, a normal temperature, and absent physical findings was a diagnostic challenge. On 16 January the white blood cell counts were elevated to 16,100 with 63 percent neutrophils, 26 percent lymphocytes. 2 percent monocytes, and 9 percent eosinophils. The sedimentation rate was 7. The hemoglobin was 14 gm. and the hematocrit was 48. A gastrointestinal series showed a hyperkinetic stomach and spasm of the small intestine. A tourniquet test proved normal. A therapeutic test for allergy with 0.5 cc. of a 1:1,000 solution of epineprine was performed with negative results. During the same day the abdominal pain became excruciating and was not controlled with meperidine hydrochloride. The patient passed another large, bloody stool. Definite rigidity, spasm, and tenderness in the left lower abdominal quadrant near the midline and generalized rebound tenderness had developed. Peristaltic sounds were present but diminished. The white blood cell count was 16,500 with 82 percent polymorphonuclear cells, 14 percent lymphocytes, 1 percent monocytes, and 3 percent eosinophils. An exploratory laparotomy was advised. The preoperative diagnoses in order of probability were inflammation of Meckel's diverticulum, intussusception, an abdominal vascular accident, and intestinal ulceration.

Under spinal anesthesia a right paramedian incision was made in the midabdomen. On opening the peritoneum about 500 cc. of straw-colored fluid were found. A specimen was taken for culture. The diagnosis became obvious when the loops of small intestine were visualized. The entire small bowel and mesentery appeared edematous. On the subserosal surface of the entire small intestine were hemorrhagic lesions from 1 to 3 cm. in diameter most marked at the terminal ileum. The vessels of the small intestine were markedly injected. The stomach and colon showed no hemorrhagic lesions. The spleen was not enlarged and no other abnormal findings were noted. The abdomen was closed.

Laboratory tests were obtained postoperatively in order to determine the type of bleeding diathesis. A bleeding time, a clotting time, a prothrombin time, a platelet count, a clot retraction, and a tourniquet test for capillary fragility were all normal and a diagnosis of nonthrombopenic purpura was made.

The patient did not improve and he required large doses of analgesics daily. He was given intravenous feedings containing 1 gm. of ascorbic acid, 4 mg. of vitamin K, and small blood transfusions daily. For the allergic origin of the disease he was given 50 mg. of benadryl q.i.d. and 0.5 cc. of a 1:1,000 solution of epinephrine in oil b.i.d. No dramatic effect resulted from this treatment. On 19 January for the first

Figure 1 (case 2). Photograph showing the confluence of the lesions around the elbows and other joints.

time a purpuric rash developed which was most prominent on the dependent body surfaces and extensor surfaces of the extremities (fig. 1). This rash was papulonodular and did not blanch on pressure. By 22 January the skin lesions had almost completely disappeated, but the patient continued to pass large tarry stools. On 24 January a generalized, erythematous, maculopapular rash and gross hematuria appeared.

The rash had all the characteristics of erythema multiforme. On 27 January, the fifteenth hospital day, the patient was transferred to the 98th General Hospital, where on 31 January treatment with 100 mg. of

cortisone t.i.d. was started. Three days later his symptoms were improved and the skin lesions had faded. On 4 February the cortisone was decreased to 200 mg. a day, but he began to develop new skin lesions. A bone marrow biopsy specimen obtained on 6 February was normal with mild reticuloendotheliosis. The course of cortisone was terminated on 16 February. At that time the patient showed evidence of nephritic involvement with hematuria and albuminuria. He was allowed an ambulatory convalescence, which was interrupted by the reappearance of the cutaneous manifestations and a persistence of the hematuria and albuminuria.

Comment. This patient presented a perplexing diagnostic problem. The association of melena and severe abdominal pain in the presence of a normal temperature suggested an acute surgical condition within the abdomen. The use of the tourniquet test for diagnosis and the therapeutic test with epinephrine were of no aid. A laparotomy under such circumstances is justifiable. Cortisone appears to have definite value in the treatment of this condition.

DISCUSSION

Many observers have reported cases of Schoenlein-Henoch disease without cutaneous manifestations (3-8). Edema of the small intestine with characteristic hemorrhagic lesions particularly of the terminal ileum is usually found at operation. The possible complications of such lesions include obstruction, intussusception, and gangrene with perforation. Involvement of the entire small intestine, stomach, cecum, and ascending colon have also been reported. Several diagnostic procedures have been recommended. Barnes and Duncan (8) recommended (1) testing capillary permeability by means of a tourniquet, (2) examining the skin for dermographia, and (3) observing the therapeutic effect of epinephrine given intramuscularly. Of these procedures, the tourniquet test is frequently negative, and the therapeutic test with epinephrine is of no value because of the hemorrhagic condition of the intestinal wall, but the presence of dermographia is of value. Gairdner (9) stated that on firmly stroking the skin of a patient's arm with a blunt rod, the wheal produced soon completely fades and the next day is replaced by a bright

(3) Bailey, H.: Purpura as acute abdominal emergency. Brit. J. Surg. 18: 234-240, Oct. 1930.

(4) Trimble, I. R.: Erythematous group of skin diseases with especial reference to abdominal pain. J. A. M. A. 96: 2010-2014, June 13, 1931.

(5) Sturtevant, M., and Graef, I.: Henoch-Schönlein purpura with paralytic ileus and rheumatic carditis. M. Clin. North America 17: 91-101, July 1933.

(6) Althausen, T.L.; Deamer, W. C.; and Kerr, W. J.: False "acute abdomen"; Henoch's purpura and abdominal allergy. Ann. Surg. 106: 242-251, Aug. 1937.

(7) Schwartzman, J.: Henoch's purpura with intussusception. Arch. Pediat. 57: 389-394, June 1940.

(8) Barnes, C. G., and Duncan, G. W.: Anaphylactoid purpura simulating acute regional ileitis. Brit. J. Surg. 29: 253-255, Oct. 1941.

(9) Gairdner, D.: Schonlein-Henoch syndrome (anaphylactoid purpura). Quart. J. Med. 17: 95-122, Apr. 1948.

red line which subsequently fades and becomes brown. In the same way the skin creases beneath a sphygmomanometer cuff become outlined in from 12 to 24 hours after a blood pressure reading. Any intradermal injection produces a delayed reaction which is likely to cause false positive reading of a Mantoux or other intradermal test. The chief disadvantage of this test is the delay of from 12 to 24 hours required to determine the result.

Although Schoenlein-Henoch disease may simulate an acute condition within the abdomen, laparotomy in this condition is not to be condemned because of the possibility of surgical complications (9). At times the only means of diagnosis will be by surgical intervention.

BOOK REVIEW

Diagnostic Methods in Veterinary Medicine, by *Geo. F. Boddie,* B. Sc. (Edin.), M. R. C. V. S., F. R. S. E., Professor of Medicine, Royal (Dick) Veterinary College, Edinburgh, with a chapter on Clinical Haematology by *H. H. Holman,* D. Sc., Ph. D., M. R. C. V. S., Pathologist, Agricultural Research Council's Field Station, Compton, Berkshire, and a Chapter on Diagnosis of Poultry Diseases, by *J. G. Campbell,* F. R. C. V. S., Department of Poultry Diseases, Royal (Dick) Veterinary College, Edinburgh. 389 pages; illustrated. J. B. Lippincott Company, Philadelphia, Pa., publisher, 1951. Price $5.

This third edition of Boddie's text contains relatively few changes from the preceding edition. The chapter on allergic reactions has been expanded to include the latest information on tuberculin testing and the chapter dealing with urinalysis in the older edition has been enlarged and now includes general information on clinical biochemistry. Following an introduction there are chapters on general examination, digestive system and abdomen, respiratory system, circulatory system, urinary system, nervous system, skin, lymphatic system, sense organs, genitalia and mammae, locomotor system, allergic reactions, collection of material for laboratory examination, clinical biochemistry, clinical bacteriology, clinical helminthology, clinical haematology, post-mortem technic, and diagnosis of poultry diseases. The book is well written, covers the subject completely, and lends itself to quick reference. It is a valuable addition to the veterinarian's library.

—*Lt. Col. K. H. Willers, VC, U. S. A.*

Echinococcus Cysts of the Liver With a Report of Two Cases[1]

Luther G. Bell, *Captain, MC, U. S. N.*
Joseph L. Yon, *Commander, MC, U. S. N.*
David J. Williams, Jr., *Lieutenant Commander, MC, U. S. N.*

THE *Echinococcus granulosus*, or dog tapeworm, is a small parasite, not more than 6 mm. in length (2). It consists of a head and neck (scolex) which has 4 suckers and is encircled by a double row of hooklets (about 30 in all), and somatic segments. The adult worm is found in the intestines of dogs, wolves, and other carnivores. The most distal of the worm's 3 segments is the ripe, gravid segment which contains from 500 to 800 ova. Following maturation of these ova, the whole segment or the extruded ova are passed in the feces of the host animal. The ova are then consumed by one of the intermediate hosts, such as cattle, sheep, hogs, or man, in contaminated food or water. The ovum passes through the mucosa of the intestine of the intermediate host into the blood stream and thence to various parts of the body. The dog or wolf eats the infected tissue of the intermediate host, and the life cycle is started over with maturation of the larvas to adult tapeworms.

The ovum on lodging in the liver or one of the other organs begins to grow, usually very slowly, and forms a cyst. These cysts are of two types, the unilocular and, a much less common type, the alveolar. The typical unilocular cyst consists of an outer layer which is thick, laminated, and elastic and is surrounded by a marked fibrotic tissue reaction of the host, and an inner layer which is the nucleated germinal layer. Numerous small infoldings or papillas form from this inner layer and eventually break off into the cystic fluid as single-layer vesicles known as brood capsules. By the budding of these vesicles, scolexes or matured larvas develop and are ready to start a new life cycle. Sometimes instead of the immediate development of brood capsules, daughter

(1) U. S. Naval Hospital, Philadelphia, Pa.
(2) Strong, R. P.: Stitt's Diagnosis, Prevention and Treatment of Tropical Diseases. 6th edition. The Blakiston Co., Philadelphia, Pa., 1942. pp. 1474-1479.

or even granddaughter cysts may form which are in all respects similar to but smaller than the mother cyst. The alveolar cyst undergoes essentially the same maturation process, but the germinal layer breaks through the outer laminated layer, forming multiple daughter cysts outside the mother cyst and spreading to form a more diffuse mass, resembling a malignant growth. Whether this is a different species or is the result of spatial limitation is still undetermined.

The *diagnosis* of echinococcus cysts of the liver is notoriously difficult, especially in the United States where, because of the relatively low incidence of the disease, it is not always borne in mind. These cysts may simulate cirrhosis of the liver, cholecystitis, abscess, or primary and secondary neoplasms of the liver. It is estimated that 25 percent of human beings infested with the echinococcus go through life without any symptoms. A review of the literature by Magath revealed that less than 500 cases had been reported in this country up to 1939 and, of these, less than 5 percent were natives of the United States or Canada. The liver is the most common site for these cysts being the primary location in about 65 percent of patients, and of these the right lobe is involved 85 percent of the time (3). The lung is the next in frequency of involvement, being the site in about 24 percent. Cysts have been found in striated muscle, bones (including the spine), kidneys, spleen, brain, heart, thyroid, breasts, parotid, prostate, and pancreas (4).

Cysts of the liver may continue to grow for many years (5) or throughout a person's life without producing any signs except enlargement of the liver and some accompanying vague subjective complaint such as a sensation of fullness or of weight in the epigastrium. More rarely nausea, vomiting, respiratory distress, and even cardiac embarrassment may occur. In a report of 40 patients from the Mayo Clinic (5), 14 had a history of severe biliary colic, and all but one of these had been jaundiced; 10 gave a history of mild or indefinite pain in the right upper abdominal quadrant; 16 had no complaint referable to the biliary tract. Poore and his associates (5) reported that jaundice occurs usually not as a result of compression of the bile ducts directly but by embolic obstruction of the ducts by daughter cysts, a portion of the cyst wall or other debris following rupture of the mother cyst. A cyst may suppurate and produce a liver abscess. It may rupture into large bile ducts or into the peritoneal cavity. If it ruptures into the peritoneal cavity, a sudden fatal anaphylactic shock may result. If the patient survives, multiple implants and secondary cysts may occur.

(3) Barnett, L.: Progress in our knowledge of hydatid disease, with some contributions thereto from Otago Medical School. New Zealand M. J. 44: 304-308, Dec. 1945.

(4) Cole, G.: The Australasian Hydatid Register, The Health Bull., Melbourne Nos. 83/84: 2255-2261, July-Dec. 1945.

(5) Poore, T. N.; Marvin, C. P.; and Walters, W.: Echinococcal cysts obstructing common bile duct; report of case. Arch. Surg. 59: 1001-1006, Nov. 1949.

The diagnosis of this condition is suggested when a mass is felt in the upper abdomen, associated with vague gastrointestinal or biliary tract symptoms, in a patient otherwise not seriously ill. A deformity of the diaphragm or a calcified cyst wall in the liver seen on roentgenographic examination is suggestive. The echinococcus cyst is the most common cause of calcification within the liver (6), but it must be differentiated from calcified abscess, either pyogenic or amebic, and calcified hemangioma. Diagnostic puncture is dangerous because it may result in spread to the peritoneal cavity, or fatal anaphylactic shock, and, even if uncomplicated, may not reveal the diagnostic hooklets or scolexes. Significant eosinophilia is present in 25 percent of the patients (7). Fortunately, specific tests for this infestation are available (8). The first and easiest is the Casoni skin test. This is an intradermal test using 0.25 cc. of filtered hydatid fluid. The reaction may be immediate or delayed. In a typical immediate reaction, the wheal increases in size and develops pseudopodial outrunners. It reaches its maximum size in from 10 to 20 minutes and is negative if less than a 20 mm. reaction occurs. Early false positives may be seen in patients with other allergic manifestations or other parasitic infestations especially with *Taenia saginata* and *Taenia solium*. If a patient has none of these diseases, an early positive reaction is diagnostic of hydatid disease in 75 percent of patients. Absence of a positive immediate reaction is indicative of no echinococcus infestation in at least 95 percent of patients. This immediate reaction is only of value before the first operation because a positive reaction may persist for years after surgical removal of a cyst with no further infestation. A delayed reaction is the development of an area of erythema with subjacent induration that subsides in from 12 to 24 hours. This may be an intense reaction. This delayed reaction, if positive, is diagnostic of hydatid reaction is the development of an area of erythema with subjacent induration that subsides in from 12 to 24 hours. This may be an intense reaction. This delayed reaction, if positive, is diagnostic of hydatid disease but occurs in only about 50 percent of patients. It is of no value in the diagnosis of recurrent or residual cysts. A certain number of patients given the skin test, regardless of the results of the test, will show an increase in the eosinophils in the blood from 24 to 48 hours after the test. This is of diagnostic value. The precipitin test, said to be positive in 65 percent of patients with the disease, and the complement fixation test, an exacting laboratory procedure reported by various authors as positive in from 60 to 80 percent of patients, are also used.

Treatment. These cysts should be treated because they may suppurate or perforate into bile ducts or the peritoneal cavity. One of the

(6) Heilbrun, N., and Klein, A. J.: Massive calcification of liver; case report with discussion of its etiology on basis of alveolar hydatid disease. Am. J. Roentgenol. 55: 189-192, Feb. 1946.

(7) Grana, A. (Montevideo): Hydatid allergy. Ann. Allergy 4: 207-212, May-June 1946.

(8) Casoni test; review. Post-Grad. M. J. 22: 203-204, July 1946.

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following surgical procedures may be used: (1) Removal of the cyst contents followed by suture of the adventitia without drainage; (2) removal of the cyst contents followed by marsupialization and drainage of the adventitia; (3) removal of the cyst contents without suture or drainage of the adventitia; or (4) total removal of the cyst (9). In the first three procedures the usual technic is to aspirate a small quantity of the fluid, depending on the size of the cyst, and replace this with a 2 percent solution of formaldehyde in water. This is allowed to remain in the cyst for at least 5 minutes. The cyst is then evacuated of its contents after being carefully packed off from the surrounding tissues. The walls of the cyst are then carefully wiped clean with the formaldehyde solution. If the cyst is marsupialized, it is usual to pack it with gauze and leave this in place for 6 days. A small amount of the pack is removed each day until it is all out on the tenth or eleventh day. The defect in the liver usually fills in, but it may drain for an indefinite period. The senior author saw a cyst, not reported in this article, which was marsupialized and packed with glycerin gauze, following which complete extrusion of the cyst wall occurred on about the twenty-first day. The defect in the liver filled in rapidly. This was so dramatic that in cases of marsupialization, packing with glycerin may be considered in the postoperative management of these patients. It was supposed that the hygroscopic effect of the glycerin caused shrinking of the cyst lining. Dorrance and Bransfield (10) reported a patient who was marsupialized 5 years previously who had developed a chronic sinus from which daughter cysts were exuded periodically. The patient was treated with radiation, the drainage promptly ceased, and the sinus healed in about a month. The rationale was the effect of the radiation on the germinal layer. The ideal treatment, if technically possible, is complete excision of the cyst.

CASE REPORTS

Case 1. A 60-year-old man, who had lived in Italy until 10 years of age, was admitted to this hospital on 15 August 1949 complaining of epigastric pain following meals. One year prior to this, his local physician had operated on him for an epigastric mass and reported finding an inoperable sarcoma. Physical examination on admission revealed a thin, somewhat pale man in no acute distress. A mass about the size of a grapefruit was felt in the epigastrium. The patient had been aware of this mass since 1910. The laboratory findings were normal. A roentgenogram of his abdomen revealed a partially calcified cystic lesion, apparently attached to the left lobe of the liver (fig. 1). A tentative diagnosis of echinococcus cyst of the liver was made, and on 19 August a laparotomy was performed. Four cystic lesions were found in the liver, 3 in the left lobe and 1 in the lateral part of the right lobe. The 3 cysts

(9) Arce, J.: Hydatid cyst of liver. Arch. Surg. 42: 973-987, June 1941.

(10) Dorrance, G. M., and Bransfield, J. W.: Evaluation of surgical treatment of recurrent echinococcic cysts of liver followed by deep x-ray therapy. Am. J. Trop. Med. 27: 77, Jan. 1947.

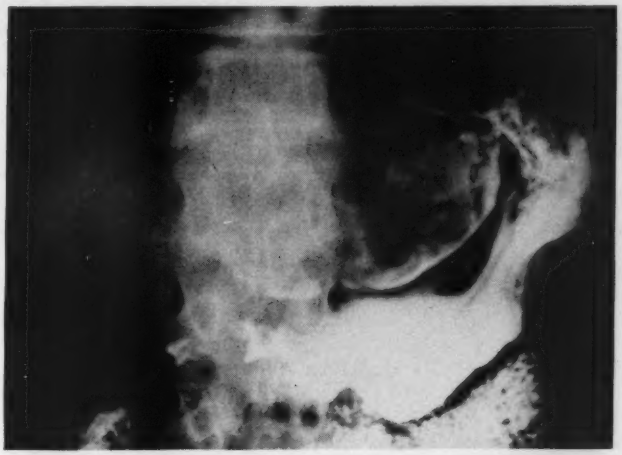
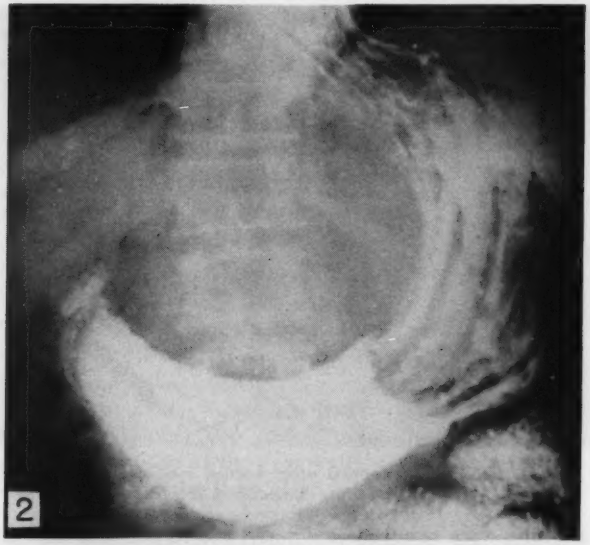


Figure 1 (case 1). Roentgenogram after barium meal showing calcified cyst wall displacing stomach to the left.

in the left lobe were removed intact and the fourth cyst was left for a second stage because of its inaccessibility at that time. On 11 February 1950 he was readmitted and the cyst in the right lobe was excised. The pathologist reported echinococcus cysts of the liver.

Case 2. A 54-year-old man, who had lived in Greece until 16 years of age, was admitted to the medical service on 15 August 1950 with pneumonia. During the routine physical examination he was found to have a nontender round mass, about the size of a large grapefruit, in the epigastrium. The mass was not fixed and moved with respiration. The patient had been aware of this mass for at least 10 years. His only abdominal complaint was discomfort after a large meal and indigestion at times. On recovery from his pneumonia he was transferred to the surgical service. Laboratory findings were normal.

A gastrointestinal series revealed a paraesophageal hiatal herniation of a portion of the cardiac end of the stomach. There was evidence of some extrinsic pressure along the lesser curvature (fig. 2), and on a lateral film the stomach was seen to be displaced posteriorly. It was believed from the clinical and roentgenologic evidence that this was a cyst arising from the left lobe of the liver and, even though no antigen was available for the Casoni skin test, that it was echinococcic in origin. A laparotomy was performed on 20 September and a large cystic mass arising from the left lobe of the liver was found. The hiatal hernia was noted but was not repaired because of the extensiveness of the operative procedures necessary for the removal of the cyst. This unilocular cyst, substance intact, was removed from the liver (fig. 3) by sharp and blunt dissection, using large mattress sutures to control the



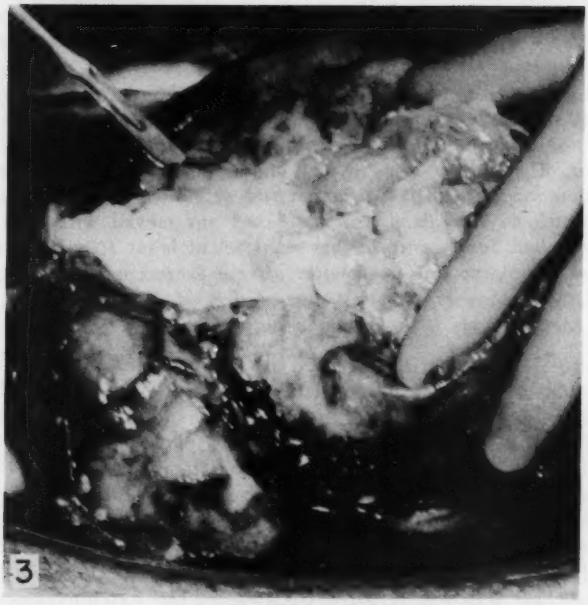


Figure 2 (case 2). Roentgenogram revealing stomach displaced to the left and downward by an extrinsic mass. Figure 3 (case 2). Gross specimen showing daughter cysts.

hemorrhage and then smaller mattress sutures to close the defect. Several large venous sinuses were ligated individually.

Examination of the cyst revealed the wall to be composed of fibrous and collagenous tissue. A section of one of the daughter cysts revealed numerous typical brood capsules. Hooklets were identified from the specimen, confirming the preoperative diagnosis. The patient was seen 30, 60 and 90 days postoperatively. His appetite was excellent and he stated that he had only an occasional attack of indigestion. A second gastrointestinal series revealed the paraesophageal hiatal hernia of the stomach to be unchanged.

BOOK REVIEW

Methodology and Technics for the Study of Animal Societies, by *J. P. Scott, John B. Calhoun, C. R. Carpenter, N. E. Collias, John T. Emlen, J. L. Fuller, Leonard J. Goss, Laurence Irving, Bernard F. Riess, T. C. Schneirla,* and *John W. Scott.* Editor, *Roy Waldo Miner;* Associate Editor, *B. J. Henegan;* Consulting Editor, *J. P. Scott.* Volume 51, Art. 6. Pages 1001-1122 of Annals of the New York Academy of Sciences; illustrated. The New York Academy of Sciences, New York, publisher, November 7, 1950. Price $2.50.

This series of papers is the result of work begun in 1946 at which time a conference on genetics and social behavior in animals resulted in the recognition of the need for field studies of natural animal groups. Following a forward by J. P. Scott these studies include: (1) General Plans and Methodology for Field Studies of the Naturalistic Behavior of Animals by C. R. Carpenter; (2) The Social Behavior of Dogs and Wolves: an Illustration of Sociobiological Systematics by J. P. Scott; (3) The Relationship between Observation and Experimentation in the Field Study of Behavior by T. C. Schneirla; (4) Measurement of Some Physiological Reactions to Arctic Conditions by Laurence Irving; (5) Instruments for the Measurement of Physiological Reactions of Unrestrained Animals by J. L. Fuller; (6) Effects of Nutrition and Diseases on Experimental Animals by Leonard J. Goss; (7) A Study of the Phylogenetic or Comparative Behavior of Three Species of Grouse by John W. Scott; (8) Social Life and the Individual among Vertebrate Animals by N. E. Collias; (9) The Isolation of Factors of Learning and Native Behavior in Field and Laboratory Studies by Bernard F. Riess; (10) Techniques for Observing Bird Behavior under Natural Conditions by John T. Emlen; and (11) The Study of Wild Animals under Controlled Conditions by John B. Calhoun. This series is no more than an introduction to the subject and is in no way a complete reference work.

—*Lt. Col. K. H. Willers, VC, U. S. A.*

BOOK REVIEW

Genetics in Ophthalmology, by *Arnold Sorsby,* Research Professor in Ophthalmology, Royal College of Surgeons and Royal Eye Hospital; Surgeon, Royal Eye Hospital, London. 265 pages; illustrated. The C. V. Mosby Company, St. Louis, Mo., publisher, 1951. Price $9.50.

The fact that congenital and hereditary defects of the eyes, though not numerically the most significant causes, are responsible for the greatest amount of blindness as measured in years, has prompted the author to prepare this clear, concise, and tremendously interesting book. The first section is devoted to a theoretical discussion of modes of inheritance, gene mechamisms, chromosome mechanisms, environmental factors, illustrative pedigrees, and clinical varieties of genetic disease. The latter includes short descriptions of congenital anomalies, abiotrophic anomalies, phakomatoses, neoplasms, metabolic disorders, functional derangements, and syndromes. A chapter on prospects in the control of genetic disease follows. This section is appealing for its crystal-clear review of the subject of genetics in general. Numerous excellent diagrams and drawings are helpful.

Section 2 deals with isolated ocular anomalies, considering changes in the globe as a whole, cornea, lens, uveal tract, retina, optic nerve, and other tissues in that order. The discussions of corneal dystrophies and cataracts are particularly well illustrated. The summary of the features of Lever's disease is excellently presented. Each condition described is accompanied by diagrams of an illustrative pedigree, which keeps the genetic aspect constantly in the mind of the reader. The colored illustrations of this section are especially good.

The third and last section describes ocular aspects of generalized disorders. The discussions of metabolic disorders, albinism, affections characterized by abnormal blood and tissue chemistry, skeletal disorders, central nervous system abnormalities, dental anomalies, allergic diseases, and a group of mesodermal, ectodermal, and neuroectodermal syndromes, should appeal to all physicians, regardless of specialty. Dr. Sorsby's description of each condition is complete, but brief, which makes the entire text most readable. The discussions of transmissions of various conditions genetically should be of assistance to all physicians in advising their patients what eye abnormalities to expect in their children. The print is clear, the paper is of good quality, and the book is well bound.

—*Lt. Col. F. E. Hull, MC, U. S. A.*

Antibiotics in the Treatment of Relapsing Fever

Ira B. Harrison, *Major, MC, U. S. A.* (1)

Richard M. Whittington, *Captain, MC, A. U. S.* (1)

IN RECENT textbooks (2, 3) it is stated that penicillin, in large doses only, is effective in the treatment of animals experimentally infected with spirochetes of the genus Borrelia, the causative organism of relapsing fever. Although initial clinical experience with penicillin in conventional doses has been reported to be disappointing, our recent experience with 6 cases of relapsing fever occurring among United Nations forces in Korea indicates that penicillin, used in large doses, is efficacious in the treatment of human beings with this disease. Comparable results have been observed in 1 patient treated with aureomycin.

CASE REPORTS

Case 1. A 19-year-old Negro was admitted to this hospital on 28 April 1951 with a history of a 5-day illness characterized by chilly sensations, headache, generalized muscular pain, arthralgia, cramping abdominal pain, and persistent fever. The onset of his illness was insidious and was associated with anorexia and malaise. He gave no history of contact with an insect vector. On admission his temperature was 104° F. His pharyngeal mucosa was infected and there was tenderness in the right upper abdominal quadrant. His leukocyte count was 14,800 with a normal differential count. His icterus index was 8 and his thymol turbidity was 6 units. A smear of the peripheral blood stained with Wright's stain showed many organisms typical of Borrelia. The patient was given 200,000 units of aqueous penicillin intramuscularly every 6 hours for 10 days. His temperature fell by crisis to

(1) Fourth Field Hospital.

(2) Simmons, J. S.: Relapsing fever. In Cecil, R. L.: Textbook of Medicine. 7th edition. W. B. Saunders Co., Philadelphia, Pa., 1947. pp. 417-423.

(3) Beeson, P. B.: Relapsing fever. In Harrison, T. R.: Principles of Internal Medicine. 1st edition. The Blakiston Co., Philadelphia, Pa., 1950. pp. 996-998.

normal after the third injection of penicillin and did not become elevated again during a hospital observation period of 3 weeks. Daily peripheral blood smears showed no spirochetes after 24 hours of therapy. His symptoms abated promptly after the fever subsided and his convalescence was uncomplicated.

Case 2. A 30-year-old Negro was admitted on 2 May 1951 with a history of a 9-day febrile episode, terminating 5 days previously. It had been characterized by chills, fever, nausea, vomiting, cramping abdominal pain, and headache. He had been treated empirically with chloroquine without satisfactory response. On the day of admission he experienced similar symptoms, and his temperature rose to 103° F. He recalled having noticed several "bites" on his arm about 5 days before the first onset of fever, but had noted no lice. He appeared to be dehydrated and had bilateral axillary adenopathy and abdominal distention associated with generalized tenderness, most pronounced in the upper quadrants. His leukocyte count was 10,500 with a normal differential count. His icterus index was 4 and his thymol turbidity was 12 units. Spirochetes typical of Borrelia were seen in the peripheral blood smear. He was given aqueous penicillin. His temperature promptly fell to normal. Spirochetes were not seen in the peripheral blood smears after the second hospital day. He was asymptomatic after 2 days of therapy and there was no relapse during a 3-week period of observation. The thymol turbidity test returned to normal.

Case 3. A 22-year-old Belgian was admitted on 13 May 1951 because of hysterical aphonia. On 15 May he had an initial febrile episode with a temperature of 99.6° F. The following day his temperature rose to 104° F. At this time he had minimal, nonspecific complaints compatible with fever. There was no history of vector contact. Physical examination was negative. The leukocyte count was 6,550 with a normal differential count. A blood smear was negative for Borrelia or plasmodia. His temperature fell to normal by crisis on the following day. His speech returned to normal with amytal narcosis, and he returned to duty on 20 May. Later that day his temperature again rose to 103.2° F. and he was readmitted complaining of dizziness, photophobia, blurring of vision, headache, nausea, and vomiting. The only positive physical finding was tenderness over the right costovertebral angle. His leukocyte count was 13,200 with 87 percent neutrophils. His thymol turbidity was 7 units. His icterus index was 7. Urinalysis showed a 3 plus albumin and numerous fine granular casts. Organisms typical of Borrelia were noted in the peripheral blood smear. The patient was given 200,000 units of aqueous penicillin every 6 hours. Borrelia were not seen in the peripheral blood after 12 hours. He was afebrile and asymptomatic in less than 24 hours. Treatment was continued for 10 days and during this time laboratory studies were repeated and found to be normal. The patient was observed for 3 weeks during which time there was no relapse.

Case 4. A 19-year-old man was admitted on 18 May 1951. He had been in good health until 13 May when he experienced nausea, vomiting, chills, and fever. This was followed by anorexia, diarrhea, and dizziness. On 15 May he sustained a gunshot wound of the left forearm, resulting in a compound fracture of the radius. Coincidental with this battle injury, his temperature rose to 103° F. He denied contact with lice. At another hospital, physical examination revealed, in addition to the gunshot wound, a palpable nontender liver, and minimal generalized lymphadenopathy. The leukocyte count was normal. Borrelia were reported to be present in the blood smear. His wound was debrided, the forearm placed in a cast, and he was given three injections of 300,000 units of procaine penicillin at 12-hour intervals. On admission to this hospital, 12 hours after the last penicillin injection, his temperature was 102.8° F. The above physical findings were confirmed. A peripheral blood smear was still positive for Borrelia. His icterus index was 15 and his thymol turbidity was 8 units. His temperature rose to 105.4° F. in the hour after admission and treatment with 200,000 units of aqueous penicillin every 6 hours was instituted. Within 12 hours his temperature had returned to normal and he was asymptomatic. Repeated blood smears failed to reveal Borrelia. His icterus index and thymol turbidity returned to normal. Treatment was continued for 10 days and no relapse occurred. The patient had to be evacuated because of his fracture and could not be observed further.

Case 5. A 26-year-old man was admitted on 7 May 1951 with a febrile illness of 6-day duration. He recalled having had contact with lice 1 week before the onset of his illness. Symptoms included chills, fever, anorexia, nausea, muscular and joint pain, headache, dizziness, insomnia, and vague abdominal discomfort. His temperature was reported to be 103.4° F. at another hospital where he was admitted on the third day of his illness. Borrelia were found in the peripheral blood smear. He was given 300,000 units of procaine penicillin twice daily. After 24 hours of therapy he was reported to be afebrile and the blood smear reported to be negative for Borrelia. On admission to this hospital, his temperature was 97.6° F.; he was moderately dehydrated and had slight generalized lymphadenopathy. The presence of Borrelia on the initial transmitted slide was confirmed. Subsequent serial smears were negative. He was given 200,000 units of aqueous penicillin every 6 hours for 10 days and was observed for 3 weeks. He remained afebrile. His convalescence was uncomplicated.

Case 6. A 19-year-old Negro was admitted on 18 May 1951 with a history of hospitalization elsewhere 2 weeks previously for a febrile illness. This had been abrupt in onset with frank chills, headache, generalized muscular aching, and anorexia. He recalled having had lice about 5 days prior to the onset. His fever was of 5-day duration, terminating abruptly. He had been given 2 injections of penicillin daily for 4 days and returned to duty when his fever had subsided. About 10

days later he experienced similar symptoms, again of abrupt onset, with a frank chill. On admission his temperature was 104° F. His leukocyte count was 18,950 with a normal differential count. A peripheral blood smear was positive for Borrelia. He was given aqueous penicillin. A blood smear 16 hours after starting treatment was negative for Borrelia. His temperature fell to normal within 24 hours, and remained normal throughout the 3 weeks of hospitalization. His convalescence was uneventful.

Case 7. A 22-year-old man was admitted on 20 May 1951 with a history of a 3-day febrile episode about 2 weeks before admission. The illness was of abrupt onset with frank chills, generalized muscular aching, anorexia, nausea, malaise, and headache. Following this febrile period he was symptom-free for 10 days when he again experienced the symptoms mentioned. He was admitted to another hospital with the following recorded findings: a temperature of 103° F., dehydration, tenderness in the right upper abdominal quadrant, and a palpable liver. A peripheral blood smear was positive for Borrelia. He had been given 250 mg. of aureomycin every 4 hours. He was transferred to this hospital 2 days later. At that time he was afebrile and asymptomatic. The only positive physical finding was a palpable spleen. A peripheral blood smear showed no spirochetes. His leukocyte and differential counts were normal. His icterus index was 6 and his thymol turbidity was 3 units. All therapy was discontinued. He was observed for 3 weeks and had no relapses.

SUMMARY

Six of 7 patients with louse-borne relapsing fever occurring in April and May 1951 among United Nations forces in Korea were treated with 200,000 units of aqueous penicillin every 6 hours for 10 days. One of these patients presumably relapsed after previous treatment with procaine penicillin. Another patient was still febrile and had demonstrable spirochetes in his blood after treatment with 900,000 units of procaine penicillin over a 36-hour period. In all the patients treated with aqueous penicillin, there was prompt remission and no relapses occurred. No Herxheimer reactions were observed. One patient was treated with aureomycin with comparable results.

CONCLUSIONS

Aqueous penicillin in doses of 200,000 units every 6 hours is an effective agent in the treatment of relapsing fever.

Aureomycin appears to be equally effective. Further clinical trial of this drug is warranted.

Intrahepatic Calcification

Seymour A. Kaufman, *First Lieutenant, U. S. A. F. R. (MC)* (1)

ALTHOUGH calcification in certain structures of the body is not unusual, in the liver it is an uncommon finding. A patient in whom intrahepatic calcification was found was recently studied at this hospital.

CASE REPORT

A 43-year-old man was admitted with the symptoms of a peptic ulcer. He had had these symptoms for 6 months. The diagnosis of an active duodenal ulcer was confirmed and the patient responded well to medical treatment. Follow-up examinations showed evidence of healing. X-ray examination on admission revealed a deformed spastic duodenal cap with a small ulcer niche on the lesser curvature near the apex. There was a round area of amorphous calcification, measuring 3.5 by 4 cm., in the right upper quadrant of the abdomen (fig. 1). Following a cholecystogram, barium enema, and gastrointestinal series this was identified as lying within the right lobe of the liver. Liver function tests were within normal limits.

DISCUSSION

In routine roentgenologic practice intrahepatic calcification is usually an incidental finding. That it is an unusual observation is attested to by the many reports describing a single case. In a series of 8,000 autopsies it was encountered only once and its cause was undetermined (2). A review of the recent literature reveals that most of the cases are of undetermined cause and are diagnosed by exclusion as being due to calcification in an echinococcal cyst (3). Other less common causes of clacification have been described (4).

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(1) U. S. A. F. Hospital, Westover Air Force Base, Mass.

(2) Heilbrun, N., and Klein, A. J.: Massive calcification of liver; case report with discussion of its etiology on basis of alveolar hydatid disease. Am. J. Roentgenol. 55: 189-192, Feb. 1946.

(3) Perkins, C. W.: Large hydatid cyst of liver; case report. Am. J. Roentgenol. 64: 473-474, Sept. 1950.

(4) McCullough, J. A. L., and Sutherland, C. G.: Intra-abdominal calcification: Interpretation of its roentgenologic manifestations. Radiology 36: 450-457, Apr. 1941.

Echinococcosis is rare in this country, 95 percent of the patients being of foreign birth (5). The etiologic factors, pathogenesis, and clinical findings are well documented in many excellent publications originating from outside the United States (6,7) and in the standard textbooks of parasitology (8). The liver is the organ most frequently involved, being the site of disease in about 65 percent of the patients.

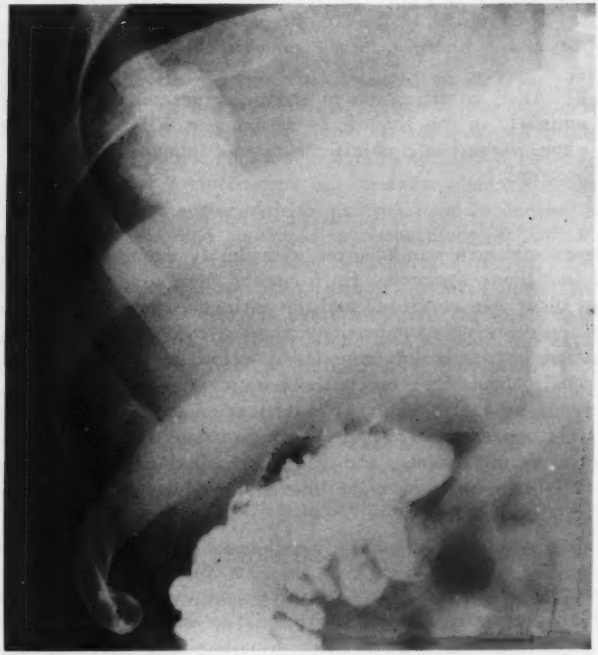

Figure 1. Anteroposterior view of right upper quadrant showing round area of calcification in relation to the hepatic flexure.

The lungs are involved in 22 percent with the spleen, kidney, bone, secondary implants in the peritoneum, muscle, and brain being the site of the disease in a progressively smaller number (6,7).

Radiologically the hydatid cyst may be manifested by a globular area of calcification within the liver substance and, on occasion,

(5) Bockus, H. L.: Gastro-enterology. Volume III. W. B. Saunders Co., Philadelphia, Pa., 1946.

(6) Oosthuizen, S. F., and Fainsinger, M. H.: Hydatid disease. Radiology 53: 248-254, Aug. 1949.

(7) Schlanger, P. M., and Schlanger, H.: Hydatid disease and its roentgen picture. Am. J. Roentgenol. 60: 331-347, Sept. 1948.

(8) Mackie, T. T.; Hunter, G. W.; and Worth, C. B.: A Manual of Tropical Medicine. W. B. Saunders Co., Philadelphia, Pa., 1945.

floating bodies within a membrane may be demonstrated (9). Hepatomegaly, an elevated right diaphragm, pleural reaction, and pulmonary infiltrates have been described as accompanying the hepatic cyst (7). If the cyst achieves sufficient size it may displace any of the abdominal viscera in the vicinity of the liver. Hydatid disease in other organs of the body is usually diagnosed on the basis of symptoms and roentgenographic findings. A round, reticulated shadow in a roentgenogram of the liver is thought to be almost pathognomonic of an echinococcus cyst, and the diagnosis has been made from the roentgenographic findings alone in many of the reported cases.

There are no constant clinical findings in hydatid disease. The signs and symptoms depend, in great part, on the location and size of the cyst. In the liver the great majority are silent. The diagnosis may be confirmed by the Casoni skin sensitivity test or the complement fixation test. An eosinophilia is found in from 20 to 25 percent of the patients (8), although some authors believe that all active cases show an eosinophilia (6). Often, however, the biologic tests may be negative, presumably because of death of all the organisms, and the diagnosis has been established in these patients by examination of the surgical specimen (10).

Intrahepatic calcification other than that which occurs in an echinococcal cyst is infrequently found. It has been described in old pyogenic abscesses and in tuberculosis as part of a generalized disease process (11). Liver calculi or intrahepatic calcium containing gallstones have been noted on a few occasions (12). The diagnosis of each of these conditions should be evident from the history and clinical evaluation. Still rarer causes of calcification that have been reported are primary hepatic carcinoma (13), hemangiomas (14) and in metastasis from an ovarian malignancy (15). Simple cysts of the liver have rarely been noted to calcify (5). Primary teratoma (16), Hodgkin's disease, and gummas have also been suggested as possible causes of intrahepatic calcification (17).

(9) Congiu, A.: Segni radiologici diretti d'idatide epatica. (Direct radiological signs of liver echinococcosis.) Ann. radiol. diag. 22: 74-80, Jan.-Feb. 1950.

(10) Ami, B. M.: Calcified echinococcosis of liver with thoraco-abdominal symptoms. Radiol. Clin. 17: 193-199, July 1948.

(11) Caffey, J.: Pediatric X-Ray Diagnosis. 2d edition. Year Book Publishers, Inc., Chicago, Ill., 1950.

(12) Golden, R.: Diagnostic Roentgenology. Volume II. Thomas Nelson and Sons, New York, N. Y. 1950.

(13) Hunt: Personal communication, cited by Golden (12).

(14) Aspray, M.: Calcified hemangiomas of liver. Am. J. Roentgenol. 53: 446-453, May 1945.

(15) Nathanson, L.: Calcified metastatic deposits in peritoneal cavity, liver and right lung field from papillary cystadenocarcinoma of ovary. Am. J. Roentgenol. 64: 467-469, Sept. 1950.

(16) Alpert, A.: Personal communication.

(17) Astley, R., and Harrison, N.: Miliary calcification of liver; report of case. British J. Radiol. 22: 723, Dec. 1949.

In a given patient an exact etiologic diagnosis of calcification in the liver cannot always be made. For practical purposes an isolated finding of a globular area of intrahepatic calcification may be assumed to be caused by an echinococcus cyst. Such an area may become quite large, measuring from 12 to 15 cm. in diameter, and is found most frequently in the right lobe of the liver. The liver function tests may be normal and the patient asymptomatic. All confirmatory signs and tests are often negative.

In the patient reported here the area of calcification was smaller than usual. The patient was native-born and had spent most of his time in the service within the continental United States and on sea duty. Confirmatory evidence for a diagnosis of hydatid disease was absent but this was considered the most likely diagnosis. His symptoms were undoubtedly caused by his duodenal ulcer and bore no relationship to the findings in his liver.

BOOK REVIEW

Management of Celiac Disease, by *Sidney Valentine Haas,* M. D. Professor of Pediatrics and Director of the Department, New York Polyclinic Medical School and Hospital; Consultant, Lebanon Hospital, Harlem Hospital, and Riverside Hospital for Contagious Diseases of the New York Health Department; Fellow of the New York Academy of Medicine, and *Merrill Patterson Haas,* M. D. 188 pages; 12 illustrations. J. B. Lippincott Co., Philadelphia, Pa., publisher, 1951. Price $5.

This excellent monograph is a veritable classic on an interesting diagnostic and therapeutic problem, written by authors with 30 years of experience in the successful study and treatment of this disease. It is especially recommended for physicians in the fields of pediatrics, general practice, and internal medicine because the disease occurs chiefly between the ages of 1 and 5 years. The book, which deals with the historical background and our present knowledge of this disease, will be read with enjoyment from cover to cover. It is suggested, however, that the reader be sure to read the summary first.

The reader is left with the impression that here is a disease for which there is a successful dietary treatment, as championed by the authors, but for which a cause has not yet been proved, although circumstantial evidence points to the possible formation of an intestinal irritant through the transformation of complex carbohydrates by bacterial action as the cause of celiac disease. An extensive bibliography is appended. —*Commander C. F. Park, MC, U. S. N.*

Relationship of Armed Forces Research to Clinical Ophthalmology

Henry A. Imus, *Ph. D.* (1)

THE mission of the Medical Departments of the Department of Defense, in addition to the prompt and adequate care of the sick and wounded, is to maintain the health and well-being of every member of the service. This program of preventive medicine begins with the first medical examination on admission and continues throughout the individual's career. On discharge for medical reasons, the Veterans Administration may continue the medical care and may provide rehabilitation services.

During World War I, visual standards for the various services were established by necessarily arbitrary decisions by ophthalmologic consultants to the Surgeons General of the Army and Navy. Much of the emphasis on high visual standards was brought about by the advent of aviation. Between wars there was little need to review the established standards because there was a plentiful supply of men who could meet the requirements and who volunteered for military service.

During the year of hurried preparation prior to Pearl Harbor, some thought was given and action taken relative to visual requirements for special jobs. For example, a research project was undertaken at the Coast Artillery School at Fort Monroe to determine standards for range-finder operators. At New London, Conn., the developing Naval Medical Research Laboratory was studying visual requirements for submarine personnel. At the Schools of Aviation Medicine, Pensacola (Navy), and Randolph Field (Army) studies of space perception and motor anomalies were undertaken. All of these activities were expedited greatly with the mobilization for World War II. The Armed Forces-National Research Council (NRC) Vision Committee, and the NRC Committee on Ophthalmology rendered valuable consultative services in reviewing visual standards, vision testing technics, ophthalmologic supply tables, and field medical kits.

(1) Psychophysiology Branch, Biosciences Group, Office of Naval Research.

In general, the ophthalmologic research program of the military departments is very relevant to operational or industrial problems. Operational problems include the visual requirements for specific military operations (rangefinders in tanks); visual standards for air crews (pilot, bombardier); night visual performance of night lookouts, night-fighter pilots, or commando-type operations; the use of contact lenses by pilots, or by ground troops; and visual factors in the use of binoculars, telescopes, and periscopes. Industrial problems include the protection of the eyes from flying particles, radiation and flash burns; chemical burns; visual factors in job performance; and color and intensity of illumination and surroundings.

In addition, both fundamental and clinical research in ophthalmology are conducted by ophthalmologists in military facilities, such as Army hospitals, naval hospitals, the National Naval Medical Center, the the Naval School of Aviation Medicine at Pensacola, Fla., the Naval Submarine Base at New London, Conn., and the Air Force School of Aviation Medicine at Randolph Air Force Base, Tex.

In the naval facilities, some of the research of interest to clinical ophthalmologists includes: (1) *The Color Atlas of Pathology*, recently produced by the U. S. Naval Medical School, National Naval Medical Center, Bethesda, Md.; (2) the development of eye prostheses for hospitalized naval personnel (2); (3) the development and evaluation of tests of color perception (3); (4) the evaluation of vision screening devices such as the ortho-rater, sight-screener, and telebinocular against standard ophthalmologic examinations (3); (5) the testing of dark adaptation and night visual perception (3); (6) research on perimetry and campimetry (3); and (7) the evaluation of vision testing equipment (4).

Much of the ophthalmologic research in the Army is being accomplished in the Eye Department of the Walter Reed Army Hospital in Washington, D. C. This research concerns: (1) visual standards for various Army jobs, as well as visual requirements for admission to West Point and Reserve Officers' Training Corps programs; (2) the effect of cortisone on ocular diseases, and the treatment of ocular injuries; (3) such protective devices as spectacles for use in gas masks, by ski troops, and for other special tasks; and (4) the selection and training of personnel to operate optical units for the dispensing and repair of spectacles.

Under Army contracts researchers at Columbia University and Harvard University have been working on the use of contact lenses. They have been interested in the effects of contact lenses on the transparency, metabolism, and hydration of the cornea, as well as on the histo-

(2) At the U. S. Naval Hospital, Philadelphia, Pa.
(3) At the U. S. Naval Medical Research Laboratory, New London, Conn.
(4) At the U. S. Naval School of Aviation Medicine, Pensacola, Fla.

logic and vascular changes resulting from the wearing of such lenses. Studies have been made also of changes in the pH of the contact-lens solution which occurs while the lens is in place on the cornea.

The Adjutant General's Office of the Army is conducting research on the relationship between photopic acuity and tests for night vision. Their major interest, however, concerns visual factors in job performance.

The Department of Ophthalmology at the Air Force School of Aviation Medicine, Randolph Air Force Base, San Antonio, Tex., has a large research staff working on such ophthalmologic problems as :

1. The effect of anoxia on the excitatory mechanisms of the retina and visual pathways. They have shown that in response to illumination of the eye of the rabbit the visual cortex survived anoxia for about 2 minutes while the optic tracts were active up to a period of 5 minutes. They found, also, that the phenomena of summation, facilitation and inhibition are affected deleteriously in the early stages of anoxia.

2. Continuing Beren's early work on visual fatigue, they have developed a new ophthalmic ergograph and have conducted a number of studies on this subject. They have been able to differentiate between normal subjects and those with asthenopic symptoms on the basis of ergograph findings. These differences they describe in the following manner: In *normal* persons (a) there is an increase in both accommodation and convergence, with a shift of phoria in the direction of esophoria; (b) there is a marked increase in positive convergence with a slight decrease in divergence; and (c) these effects are transient and readings return to habitual levels within 30 minutes. In *asthenopes* on the other hand there is (a) a decrease in accommodation with esophoria or no exophoria at near vision; (b) low prism divergence; and (c) evidence of fatigue of accommodation by recession of the near point and none of the muscle balance changes found in normal persons. As a result of the above findings, it was recommended that the muscle balance for near vision should not exceed 2 prism diopters of exophoria, accompanied by a prism divergence of from 12 to 15 prism diopters in aviators.

3. The use of contact lenses by pilots.

4. The phenomenon of night myopia.

5. Evaluation of the use of visual screening devices in selecting candidates for flight training.

6. The testing of visual acuity tested with objects at high angular speed.

7. Motion parallax as a factor in depth perception.

8. Visual factors in reading flight instruments and radar scopes and color perception as related to the discrimination of flare signals.

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The Armed Forces recognize the importance of preventive medicine, whether it be in the field or in home bases, in the air or at sea, or in military industrial laboratories and shops. Every effort is made, both by research and in operating practices, to protect the eyes from damage by missiles, flames, chemicals, radiation, and desiccation. When injuries do occur, treatment is prompt and efficacious. In patients with partial or complete loss of sight, rehabilitative measures are instituted long before discharge from the hospital.

BOOK REVIEW

Review of Physiological Chemistry, by *Harold A. Harper,* Ph. D., Professor of Biology (Biochemistry), University of San Francisco; Lecturer in Surgery, University of California School of Medicine, San Francisco; Biochemist Consultant to Metabolic Research Facility, U. S. Naval Hospital, Oakland; Director, Biochemistry Laboratory, St. Mary's Hospital, San Francisco, 3d edition. 260 pages; illustrated. University Medical Publishers, Palo Alto, Calif., 1951. Price $3.50.

This new edition brings up to date an excellent review of the fundamentals of physiologic chemistry prepared as a supplement to standard texts in the subject and a companion volume for students in biochemistry. The author begins with a presentation of the principles of general and physical chemistry which, although simple, are frequently forgotten and must be reviewed by the physician, dietitian, and nutritionist. This is followed by chapters on the organic chemistry of the carbohydrates, lipids, proteins, nucleoproteins and nucleic acids, vitamins, enzymes, and hormones. Separate chapters are devoted to the blood, lymph and cerebrospinal fluid, biologic oxidations, digestion and absorption, detoxication, metabolism, functions of the liver and kidney, water and minerals, calorimetry, and the chemistry of the tissues. Many excellent charts, illustrations, and tables aid in explaining and simplifying various physiologic mechanisms. The book would be valuable to anyone desiring a quick review of this field. The use of larger type would facilitate more rapid reading.

—*Maj. E. M. Parrott, MSC, U. S. A.*

Diagnostic Significance of Fragment Displacement in Fractures of the Carpal Navicular[(1)]

George H. Chambers, *Captain, U. S. A. F. (MC)*

John D. Blair, *Colonel, MC, U. S. A.*

FRACTURE of the carpal navicular has become a widely known entity largely because of increased awareness of the condition. Unfortunately, educational emphasis has not been generally disseminated to the medical profession regarding frequently associated dislocation of the lunate bone or perilunar dislocation of the carpus.

Nearly every orthopedist has had patients referred to him with a condition diagnosed solely as a fracture of the navicular, only to discover a coexisting dislocation of the lunate or a perilunar dislocation. One of us (JDB) had the opportunity at the European Command Fracture Center, over a period of nearly 3 years, to see many patients transferred to the Center with such a coexisting lesion which had not been diagnosed. In an informal discussion of these cases, Lieutenant Colonel Wilhelm A. Zuelzer, MC, made the observation that patients with fractured navicular associated with coexisting perilunar dislocations seemed to exhibit a gross displacement of the navicular fragments in relation to each other. On the other hand, in patients with a fractured navicular alone the fracture fragments are found in normal relationship to each other. Following the discussion, subsequent cases were more closely studied on arrival and the following was observed: (1) No patient with a fracture of the navicular alone showed gross displacement of the fracture fragments in relation to each other; (2) every patient with perilunar dislocation seen with an associated fracture of the navicular had gross displacement of the navicular fragments in relation to each other; (3) every patient with a fractured navicular

(1) Brooke Army Hospital, Fort Sam Houston, Tex.

showing gross displacement of the fragments in relation to each other was shown to have a coexisting perilunar or lunate dislocation; and (4) following reduction of the lunate or perilunar dislocation the displaced navicular fragments tended to resume their normal anatomic relations to each other.

TABLE 1. *Navicular fractures*

Location of fracture	Without displacement	With displacement
Waist	49	0
Tubercle	2	0
Body	17	0
Total	68	0

A review of the navicular injuries seen at Brooke Army Hospital from 1947 to 1951, made by one of us (GHC), revealed 75 patients with a fractured navicular. Sixty-eight of these showed no displacement of fragments (table 1). Seven had displacement of the fracture fragments. Three of the seven were associated with volar dislocation of the carpal lunate and four with perilunar dislocation (tables 2 and 3).

TABLE 2. *Dislocation (volar) of lunate*

	Fragment displacement	No displacement
With associated fractures	Through waist 2 Through body 1	0
Without associated fractures	0	2
Total	3	2

TABLE 3. *Perilunar dislocation*

	Fragment displacement	No displacement
With associated fractures	Through waist 3 Through body 1	0
Without associated fractures	0	0
Total	4	0

SUMMARY

The records of 75 patients with fracture of the carpal navicular were reviewed; 68 of these were not associated with other wrist injuries and none had separation of the navicular fragments; 7 had displacement of the navicular fragments, and each of them was associated

with either volar dislocation of the lunate or perilunar dislocation of the wrist. Only 2 of these 7 were the result of recent acute injuries and in both instances the reduction of the dislocation brought anatomic apposition of the navicular fragments.

The above data plus other clinical experience indicate that in acute navicular fractures gross displacement of the fragments may frequently indicate coexisting lunate or perilunar dislocation. Since disability is so marked in untreated dislocations of the wrist and diagnosis of such dislocations is so often overlooked, when displacement of navicular fragments is seen, it should be axiomatic that coexisting dislocations of the carpus should be searched for and either demonstrated or ruled out.

BOOK REVIEWS

Clinical Tropical Medicine, *R. B. H. Gradwohl,* M. D., Editor-in-Chief; *Luis Benitez Soto,* M. D., and *Oscar Felsenfeld,* M. D., Editors. 1,647 pages; 473 illustrations and 6 color plates. The C. V. Mosby Company, St. Louis, Mo., publisher, 1951. Price $22.50.

Medical officers of the Armed Forces and allied services are always keenly interested in the appearance of publications on tropical medicine. This book is particularly inviting because it is a collaborative effort. No one person can spend sufficient time in all sections of the tropics to know intimately all of the indigenous entities encompassed by tropical medicine. It is odd, therefore, that previous textbooks on this subject have not been the compiled writings of several authors.

All conditions one meets in warm climates are discussed completely in this book by experienced clinicians or biologists. Besides excellent clinical description, each disease is adequately covered with respect to history, cause, life cycles of vectors, descriptions of intermediate hosts, laboratory and immunologic methods of diagnosis, and prophylaxis. The illustrations are excellent, but more of them should have been in color. Those on pages 448 and 1255 demonstrate pulicine and ophidian ecstasy remarkably well.

The weakest feature of this book is the description of treatment. Too much space has been allotted to antiquated and inefficient methods of the past, and modern advances are too often barely mentioned or merely alluded to in footnotes. It is realized that clinical evaluation with some of the newer drugs has been too recent for inclusion in a textbook, but a book published in 1951 should indicate more current trends in the employment of these agents than has been the case here. It would have been better if the editors had insisted on all drugs being prescribed in the metric system, with apothecarial equivalents in paren-

theses. The use of centigrams in some sections of the book, while technically correct, is confusing and should be avoided.

The chapters on pinta and yaws should be consecutive and discussed as treponematoses. Oddly, bejel is not mentioned, and the authors have avoided the controversy of the relationship of these treponematoses to syphilis. There are excellently written chapters on hygiene and preventive medicine in the tropics, and on the adaptations of laboratory and histologic technics to the tropics. There are also excellent bibliographies appended to each chapter.

The book is too long and too expensive and this latter feature will preclude its purchase by many. It is hoped that future editions will avoid unnecessary repetition, eliminate the description of useless treatments, and such subjects as tularemia and rickettsial pox which are not primarily tropical. The latter condition has not appeared south of Brooklyn, New York. Despite the above-mentioned shortcomings, the authors are to be congratulated for such a successful cooperative effort. This book will be a valuable addition to the library of those who examine and treat residents of, and travelers to and from, warm climates. It will undoubtedly be established as one of the standard works on tropical disease.—*Capt. J. Love, MC, U. S. N.*

Food and You, by *Edmund Sigurd Nasset,* A. B., M. S., Ph. D., Professor of Physiology, Department of Physiology and Vital Economics, School of Medicine and Dentistry, University of Rochester, Rochester, N. Y. 92 pages. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $3.

"Nothing affects a person's well-being so much as the food he eats." This is the sincere belief of the author who has told the story of nutrition simply and concisely. Because of his personal interest in giving factual and nontechnical information as essential nutritional training for his daughers, he has made an important contribution to a field of growing interest. This interest, now on the upsweep, has been created by the swelling of the earth's human population and the growing need to feed this population more efficiently. Food being essential to the life of all living beings makes nutrition a strictly personal matter. This book is designed for the easy comprehension of those with no special training in nutrition. Its contents are well-organized. It begins by explaining what food is and what makes it food, and proceeds in a logical sequence to food requirements, why each persons's requirements vary, and how the body prepares each nutrient for its utilization. The nutrients are discussed in detail, highlighting the function of each one. Dr. Nasset has accomplished his mission well.

—*Capt. E. M. Girard, WMSC, U. S. A.*

Infectious Mononucleosis Manifested by Diarrhea

Stuart H. Walker, *Major, MC, U. S. A.*

INFECTIOUS mononucleosis is recognized as a disease of childhood and young adult life with protean manifestations and universal distribution, but is considered to be uncommon in the infant and the Negro and rarely manifested by diarrhea. The following case is reported because of the occurrence of this disease in a Negro infant, aged 9 weeks, whose chief symptom was diarrhea.

Bernstein (*1*), stated that prior to 1940, the youngest observed case had appeared in a 7-month-old infant (*2*). In an epidemic of infectious mononucleosis encountered in a nursery wherein all patients were less than 2 years of age, no younger case was encountered (*3*). No reported case of this disease in a patient younger than 7 months was found in a survey of the literature since 1940. Thus, it is believed that this case in a 9-week-old infant is the youngest recorded.

In view of the many infant cases reported in the literature and the nursery epidemic reported by Davis (*3*) in which 9 of 10 exposed infants contracted infectious mononucleosis, the disease cannot be considered rare in infancy nor can infants be considered less susceptible than older children. Most probably the infrequency with which cases are seen in infancy can be attributed to the lesser opportunity for exposure of this protected age group.

Though Bernstein (*1*) noted that but one Negro patient with infectious mononucleosis had been reported prior to 1940, he (apparently correctly) assumed that this was the result of infrequent detection rather than infrequent occurrence. In substantiation of this concept, a survey of the literature between 1940 and 1950 by Rathmell et al. (*4*)

(*1*) Bernstein, A. (Baltimore): Infectious mononucleosis. Medicine 19: 85-159, Feb. 1940.

(*2*) Price, J. P.: Infectious mononucleosis. Am. J. Dis. Child. 40: 581-587, Sept. 1930.

(*3*) Davis, C. M.: Acute glandular fever of Pfeiffer; report of nursery epidemic. J.A.M.A. 92: 1417-1418, Apr. 27, 1929.

(*4*) Rathmell, T. K.; Greeley, J. P.; and Granger, J. R.: Infectious mononucleosis in the Negro; report of case. Am. J. Clin. Path. 20: 977-979, Oct. 1950.

revealed 71 reported cases in Negroes. Indeed, Wechsler et al. (5) reported 49 cases in Negroes among 556 cases of infectious mononucleosis on an Army post, an incidence of 8.9 percent, nearly twice the percentage of the Negro population (4.6 percent). These workers believed that this indicated an increased susceptibility to infectious mononucleosis in the Negro. In any case, there no longer seems to be any basis for the once common belief that this disease is rare in Negroes.

Infectious mononucleosis is a systemic disease involving the respiratory, lymphatic, and reticuloendothelial systems, and the liver in most patients. In addition recent reports have drawn attention to the frequent involvement of the skin with a wide variety of rashes (5) (6), the nervous system chiefly as a lymphocytic meningitis (7-9), or an encephalomyelitis (10-12), the heart as an acute myocarditis (13) (14), and the kidney as an acute nephritis (15). Occasionally severe involvement of the usual organ systems may be manifest as an obstructive pharyngitis (16) or an atypical pneumonia (5) (17) (18), a hypoplastic or hemolytic anemia (6), leukopenia, thrombocytopenia (19-21) with or

(5) Wechsler, H. F.; Rosenblum, A. H.; and Sills, C. T.: Infectious mononucleosis; report of an epidemic in army post. Ann. Int. Med. 25: 113, July; 236, Aug. 1946.

(6) Carlile, T., and Blackford, J. M.: Infectious mononucleosis with anemia, skin rash, and jaundice. Northwest Med. 41: 137-139, Apr. 1942.

(7) Schmidt, V., and Nyfeldt, A.: Veber mononucleosis infectiosa und meningoencephalitis. Acta oto-laryng. 26: 680, 1931.

(8) Thelander, H. E., and Shaw, E. B.: Infectious mononucleosis with special reference to cerebral complications. Am. J. Dis. Child. 61: 1131-1145, June 1941.

(9) Tidy, H.: Relationship of benign lymphocytic meningitis and glandular fever. Lancet 2: 819-821, Dec. 7, 1946.

(10) Zohman, B. L., and Silverman, E. G.: Infectious mononucleosis and encephalomyelitis. Ann. Int. Med. 16: 1233-1239, June 1942.

(11) Peters, C. H.; Widerman, A.; Blumberg, A.; and Ricker, W. A. Jr.: Neurologic manifestations of infectious mononucleosis, with special reference to Guillain-Barré syndrome. Arch. Int. Med. 80: 366-373, Sept. 1947; Correction 81: 111, Jan. 1948.

(12) Graham, S. D.; Schwartz, W. H.; and Chapman, W. L.: Infectious neuronitis complicating infectious mononucleosis. U. S. Nav. M. Bull. 49: 914-919, Sept.-Oct. 1949.

(13) Jersild, T.: Mononucleosis infectiosa med letald forlb. Nord. med. (Hospitalstid.) 14: 1705-1706, June 6, 1942.

(14) Evans, W. F., and Graybiel, A.: Electrocardiographic evidence of cardiac complications in infectious mononucleosis. Am. J. M. Sc. 211: 220-226, Feb. 1946.

(15) Robbins, M. J.: Case of acute infectious mononucleosis complicated by hemorrhagic nephritis. Hebrew M. J. 1: 206, 1938.

(16) Jones, G. P., and Jones, E.: Anginose type of glandular fever requiring tracheotomy. Brit. M. J. 2: 1212-1213, Nov. 26, 1949.

(17) Rodstein, M.: Case of infectious mononucleosis with atypical pneumonia. Ann. Int. Med. 28: 1177-1187, June 1948.

(18) Rapaport, S. I.: Infectious mononucleosis; an analysis of 43 cases. Ann. West. Med. & Surg. 2: 543, 1948.

(19) Goldbloom, A. A., and Lieberson, A.: Case of infectious mononucleosis with jaundice and thrombocytopenic purpura. Am. J. Med. 5: 912-915, Dec. 1948.

(20) Kutzer, M., and Allen, E. G.: Infectious mononucleosis and acute thrombocytopenic purpura; report of 2 cases with recovery. N. York State J. M. 50: 1131-1132, May 1950.

without purpura, or panhematopenia (22), or a severe hepatitis with or without jaundice (18) (23) (24). Gastrointestinal involvement has, however, been uncommon except as part of a hepatitis or purpura with rectal bleeding (25). Abdominal pain is not uncommon (26) but is considered to be caused by mesenteric lymphadenitis rather than gastrointestinal disease per se.

Review of the literature reveals no mention of infectious mononucleosis manifested chiefly by diarrhea. Bernstein (1) stated that constipation is common while diarrhea is rare. He quoted Pfeiffer (27) as appreciating the frequency of constipation in his original description of this disease. Davis (3) mentioned that some infants in the nursery epidemic had one or two loose stools at the onset of illness. Diarrhea is a common reaction to respiratory infection in infants and that seen in this case may be merely the reaction of this very young infant to a respiratory disease. The case reported does indicate, however, that one additional disease state, infectious mononucleosis, may be segregated from the nebulous syndrome of infantile diarrhea.

CASE REPORT

A 9-week-old infant was entirely well until the onset of rhinorrhea and diarrhea consisting of 3 or 4 loose green stools per day (without gross blood or mucus). No change in the diet or contact with anyone suffering from similar symptoms preceded the appearance of the diarrhea, which gradually increased and was unaffected by tea and paregoric. Fever, slight cough, and the vomiting of a portion of each feeding appeared 1 week after the onset of diarrhea. Labored respirations were noted by the mother on the tenth day of illness. Four to six loose to watery, yellow to green stools per day, associated with vomiting, rhinitis, and cough persisted until the time of admission on the twelfth day of illness. An older sibling, aged 17 months, developed a mild diarrhea of 5 days duration, shortly after the onset of disease in this patient.

Physical examination at the time of admission revealed a well-developed, well-nourished, apathetic infant appearing acutely ill but

(21) Angle, R. M., and Alt, H. L.: Thrombocytopenic purpura complicating infectious mononucleosis; report of a case and serial platelet counts during the course of infectious mononucleosis. Blood 5: 449, 1950.

(22) Read, J. T., and Helwig, F. C.: Infectious mononucleosis; analysis of 300 cases with 3 characterized by rare hematologic features. Arch. Int. Med. 75: 376-380, June 1945.

(23) DeMarsh, Q. B., and Alt, H. L.: Hepatitis without jaundice in infectious mononucleosis. Arch. Int. Med. 80: 257, 1947.

(24) Brown, J. W., and Sims, J. L. et al.: Liver function during infectious mononucleosis. Am. J. Med. 6: 321-328, Mar. 1949.

(25) Eckstein, P., and Penney, A. L. P.: Rectal haemorrhage associated with infectious mononucleosis. Brit. M. J. 2: 962-963, Oct. 29, 1949.

(26) Sears, H. T. N.: Unusual case of infectious mononucleosis. Brit. M. J. 2: 1211-1212, Nov. 26, 1949.

(27) Pfeiffer, E.: Drüsenfieber. Jahr. f. Kinderh. 29: 257, 1889.

not dehydrated, with a temperature of 38.2° C., a heart rate of 160, and a respiratory rate of 34. Slight nasal obstruction and mucoid discharge and slight pharyngeal injection without exudate were noted. The abdomen was distended and tympanitic without spasm or tenderness. The spleen was palpated at the costal margin. Small, shotty nodes 0.5 cm. in diameter, were noted in the axillas and in the groins. No other physical abnormalities were noted at any time.

There were 10.5 gm. hemoglobin per 100 cc. The red blood cell count was 4.1 million, and the white blood cell count was 6,400 with 80 percent mononuclear and that 28 percent of these were atypical with large indented nuclei and vacuolization of the cytoplasm. Throat cultures revealed diphtheroid bacilli, *Neisseria catarrhalis*, and pneumococci on two occasions. Stool specimens were free of red or white blood cells and stool cultures on three occasions revealed no pathogenic organisms (paracolon bacilli were present in each specimen). Heterophile agglutinins were present in a serum dilution of 1:128 (1:256 final dilution with sheep cell suspension) on the sixteenth day of illness. A nucleated blood cell count on the fifteenth day was 5,400 with 4 percent segmented neutrophils, 4 percent unsegmented neutrophils, 2 percent nucleated red blood cells, 6 percent smudge cells, and 84 percent lymphocytes, the majority of which were atypical. On the seventeenth day there were 24 percent segmented neutrophils, 4 percent monocytes, 1 percent eosinophils, and 71 percent lymphocytes, many of which were atypical.

The diarrhea subsided promptly on a skimmed-milk formula after initial subcutaneous administration of fluids. The respiratory symptoms gradually regressed and were not noted after the fifteenth day of illness. A low grade fever between 37.5° and 38.5° C. continued until the seventeenth day but was not present thereafter. A 2-hour episode of marked respiratory distress with excessive mucus in the pharynx and abdominal distension was relieved by pharyngeal and gastric suction on the fifteenth day and did not recur. No symptoms of disease remained at the time of discharge on the seventh hospital day (nineteenth day of illness) though the slight lymphadenopathy and palpable spleen were still detectable.

SUMMARY

The occurrence of infectious mononucleosis in a 9-week-old Negro infant, believed to be the youngest recorded case, is reported. Infectious mononucleosis should be considered in the differential diagnosis of infantile diarrhea, though a review of the literature reveals this to be a rare manifestation of the disease.

Thrombosis of the Aorta Arising From a Patent Ductus Arteriosus[1]

Milton Kurzrok, *Commander, MC, U. S. N.*
Charles V. Carlson, *Lieutenant, junior grade, MC, U. S. N. R.*
Arthur T. Ooghe, *Lieutenant, junior grade, MC, U. S. N. R.*

A REVIEW of the literature reveals only a few cases of thrombus formation at the ductus arteriosus and all of these have been in infants. They have manifested themselves by obliterating the lumen of the thoracic aorta or by peripheral embolic phenomena. Bochdalek (2) and Luttich (3) have each described an instance of occlusion of the aorta in an infant by extension of an obliterating thrombus from a ductus arteriosus. Morison (4) described a case of thrombus extension from a congenital aneurysm of the ductus arteriosus which was closed at the pulmonary end in a 5-day-old boy. This was preceded by otitis media, diarrhea, and dehydration, and was manifested by peripheral embolic phenomena. Gross (5) also described a thrombus extension from a patent ductus in a 17-month-old boy with tetralogy of Fallot. Death in this case was preceded by diarrhea and signs of peripheral embolic phenomena.

CASE REPORT

A 10-day-old boy was admitted to the hospital on 2 November 1950. The history given described a spontaneous delivery, a birth weight of 7 lb., 8 oz., and a normal neonatal course for the first 5 days of life. On the day of admission the infant developed anorexia, watery diarrhea, lethargy, and convulsions. The physical examination revealed a de-

(1) From the U. S. Naval Hospital, Oakland, Calif.

(2) Bochdalek: Vrtljschr f. d. pracht. Heilk, 160-164, 1845. Quoted in Welch, W. H.: Embolism: System of Medicine. Allbutt, C., and Rolleston, H. D.: 6: 809, 1909.

(3) Luttich: Wien. med. Bl., 1881. Quoted in Welch, W. H.: Embolism: System of Medicine. Allbutt, C., and Rolleston, H. D.: 6: 809, 1909.

(4) Morison, J. E.: Thrombosis of aorta in newborn; three cases, one with infarction of liver. J. Path. & Bact. 57: 221-228, Apr. 1945.

(5) Gross, R. E.: Arterial embolism and thrombosis in infancy. Am. J. Dis. Child. 70: 61-73, Aug. 1945.

hydrated infant weighing 6 lb., 8 oz. with a rapid pulse and a temperature of 103° F. The eyes were sunken and the scleras injected. The mucous membranes were dry and the anterior fontanelle was soft and depressed. The penis and scrotum were cyanotic, edematous, and excoriated. Alternating periods of flaccidity and spasticity of the extremities were noted. These were associated with occasional episodes of twitching. The Chvostek, Brudzinski, and Kernig signs were all negative; nuchal rigidity was absent.

Admission laboratory studies revealed a white blood cell count of 12,400 with 1 percent neutrophils, 84 percent lymphocytes, and 15 percent monocytes; a red blood cell count of 5.4 million; and a hemoglobin of 15.5 grams. The CO_2 combining power was 66 volumes per 100 cc.; and the blood chloride level was 480 mg. per 100 cc. The patient was given 100,000 units of penicillin every 8 hours, 50 mg. of streptomycin every 8 hours, oxygen inhalations, and 150 cc. Hartman's solution with 175 cc. of 5 percent dextrose in water intravenously. Ten hours after admission his hydration was improved and above the umbilicus the skin appeared pink, but the skin of the lower trunk and legs was cool and cyanotic. The femoral arterial pulsations were absent. The tendon reflexes were absent in the lower extremities and activity of the legs was diminished. The clinical impression was a saddle thrombosis arising by retrograde extension from the genital region.

At that time the CO_2 combining power was 44 volumes per 100 cc., the blood chloride level was 550 mg. per 100 cc., and the nonprotein nitrogen was 24.5 mg. per 100 cc. The white blood cell count was 19,750 with 24 percent neutrophils, 72 percent lymphocytes, and 4 percent monocytes; the red blood cell count was 4.62 million; and the hemoglobin was 14 grams. Eighteen hours after admission a sharply defined line of cyanotic demarcation had developed, pink above the umbilical level and moderately cyanotic below. An hour later, preceded briefly by general cyanosis, the infant suddenly died.

Autopsy findings. The subject was a well-developed, white male infant, about 11 days old, weighing 2,850 grams. There was no rigor mortis. There was livor mortis over the entire body except below the inguinal ligaments where the skin was pale. The cord was almost completely healed. A minimum of thin purulent material was present about the circumcisional scar. A patent ductus arteriosus was present. An organized pale thrombus extended from the opening of the ductus down the aorta to 1 cm. above the diaphragm (fig. 1). This appeared completely to occlude the aorta. Adherent to the caudate end of the thrombus was a thin tail of postmortem clot. The endocardium appeared smooth and glistening. The round ligament contained a small fresh thrombus with no evidence of inflammation. The remnants of the hypogastric arteries also contained fresh thrombi. The rest of the blood vessels were perfectly clear. The penis revealed no abnormalities.

On microscopic examination the heart tissue was normal. The aorta contained a well-formed thrombus fixed to the endothelium beginning in the ductus arteriosus and extending a distance of 4 cm. down the aorta. Inflammatory reaction was lacking. The hypogastric vessels showed marked narrowing of their lumens by fibroblastic proliferation and a recent thrombus occluded the lumen of the artery. Degenerative changes were present in the muscle fibers. The lungs showed intense vascular congestion. The alveolar septums were thickened and compression atelectasis was evident. Numerous alveolar spaces contained precipitated albuminous material (edema fluid) and extravasated red blood cells. Sections of the brain showed pericellular vacuoles in

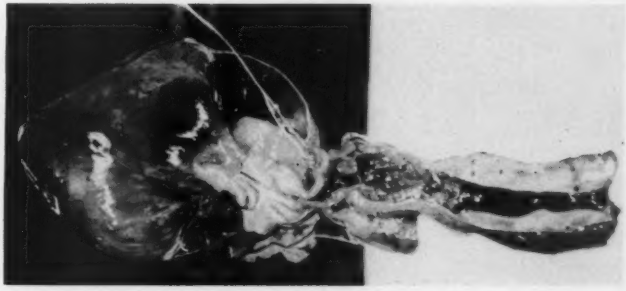


Figure 1. Thrombus in aortic arch.

the basal ganglia, pons, and frontal cortex. In the basal ganglia there was an area showing marked vacuolization of the ground substance and chromatolytic changes in the nerve cells. All the blood vessels were dilated and engorged with red blood cells. The other organs showed marked congestion.

The pathologic diagnosis was (1) thrombosis, massive, ductus arteriosus and thoracic aorta, and (2) congestion of lungs, liver, spleen, kidneys, and brain with pulmonary and cerebral edema.

DISCUSSION

In the two cases in which a clinical description was obtained (4, 5) diarrhea and dehydration were present as in this case. The resulting hemoconcentration and slowing of the blood stream may have played a role in the formation of the thrombus. Other contributing factors were the eddy currents and retardation of the blood flow through the ductus arteriosus. Other possible factors in thrombus formation at the site of the ductus arteriosus are congenital heart disease, trauma to the intima, neonatal polycythemia, and sepsis with endarteritis and myocarditis. Some of these factors may decrease cardiac output and rate of blood flow.

Preliminary reports (6) state that penicillin produces hypercoagulability but the evidence at present is insufficient to warrant any anticoagulant measures being taken (7). Gradual obliteration of a large vessel is characterized by early intermittent claudication and disturbance of sensation and circulation. Numbness, formication, coldness, pallor, cyanosis, and gangrene with severe pain develop from this abnormality. The tendon reflexes vary in their response. Paraplegia may ensue when the arterial pulsations are diminished or absent.

If the diagnosis can be made the therapy should be conservative management with anticoagulants to inhibit further extension of a thrombus. This may aid in the development of an adequate collateral circulation. Surgical measures are difficult to apply because of inability to localize the site of thrombosis. An aortic resection or thrombectomy in such a closely confined and vital area is a formidable procedure.

(6) Moldavsky, L. F.; Hasselbrock, W. B.; and Cateno, C.: Studies in mechanisms of penicillin action; penicillin effects on blood coagulation. Science 102: 38-40, July 13, 1945.

(7) Cosgriff, S. W.: Present status of problem of thrombo-embolism. Am. J. Med. 3: 740-752, Dec. 1947.

BOOK REVIEW

Ophthalmology, by *Arno E. Town,* M. D., Professor of Ophthalmology, The Jefferson Medical College of Philadelphia. 511 pages; 208 illustrations and 4 colored plates. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $10.

This is an excellent book written for the student and general practitioner and is well supplied with references for more detailed discussions on the various subjects. It is concise and clear and begins with the external examination of the eye going on to an excellent discussion of the use of the ophthalmoscope and slit lamp. Seventy-four pages are devoted to the physiology of vision. The anatomy and embryology of the eye and orbit are concisely yet adequately discussed. Inflammations, tumors, and dyscrasias of the eye and adnexa are discussed together with their treatment. The chapter on glaucoma includes classification, diagnosis, and treatment with well-labeled diagrams. The final chapter, devoted to surgery, contains illustrations which give an excellent step-by-step picture of each procedure. The author aided by 11 contributors has produced a valuable text.

—*Commander E. Kulczycki, MC, U. S. N.*

Artificial Pneumothorax in Pulmonary Tuberculosis[1]

Richard E. Mardis, *Major, MC, U. S. A.* (2)

Ray G. Cowley, *Major, MC, U. S. A.* (1)

THE prominent place of artificial intrapleural pneumothorax in the treatment of pulmonary tuberculosis, so long apparently secure, has recently shown evidence of being supplanted by other measures. With the decline in the use of pneumothorax there has been a corresponding increase in the use of pneumoperitoneum at this and other hospitals as related to the total number of both procedures (fig. 1). Credit for the first clinical use of artificial pneumothorax has been given to Forlannini, who in 1888 induced pneumothorax in a patient with pleural effusion, and who in 1892 gave it in treatment of pulmonary tuberculosis. Murphy, a surgeon, helped establish the value of pneumothorax in this country (3) but its failure to gain widespread recognition is evidenced by the fact that a book on diseases of the lungs (4) published in 1907 makes no mention of it. The subsequent gradual rise in the use of pneumothorax was largely related to the availability of roentgenographic facilities, and the period from the early 1920's to the early 1940's saw pneumothorax used widely and frequently (5, 6).

Various opinions have been expressed in the literature concerning the value of artificial pneumothorax, particularly in recent years. Cohen (6) states that "artificial pneumothorax is still the best single treatment procedure in tuberculosis in carefully selected cases, properly administered....." Hayes (7) reports in a survey of leading chest

(1) From the Fitzsimons Army Hospital, Denver, Colo.

(2) Transfered to Tripler Army Hospital, Honolulu, T. H.

(3) Gordon, B.: Indications for and technic of artificial pneumothorax. M. Clin. North America 21: 1193-1209, July 1937.

(4) Babcock, R. H.: Diseases of the Lungs. Appleton and Co., New York, N. Y., 1907.

(5) Hayes, J. N.: Present status of therapeutic pneumothorax. Am. Rev. Tuberc. 62: 1-B: 90-97, July 1950.

(6) Cohen, A. J.: Forty years' experience with artificial pneumothorax. Dis. Chest 17: 74-83, Jan. 1950.

(7) Hayes, E. W.: Abstract of replies to questionnaire on intrapleural artificial pneumothorax. Dis. Chest 15: 720, 1949.

specialists that pneumothorax is used in from 4 to 100 percent of the patients with pulmonary tuberculosis coming under their care, but that in general there has been a trend away from pneumothorax. This decline in pneumothorax has been ascribed to the high percentage of serious complications, and to the fact that recent developments in the management of tuberculosis (pneumoperitoneum, chemotherapy, excisional surgery) have lessened the acute need for this hazardous procedure (5, 8). Our purposes in this article are to review in detail a series of patients treated with pneumothorax, to outline contraindications to

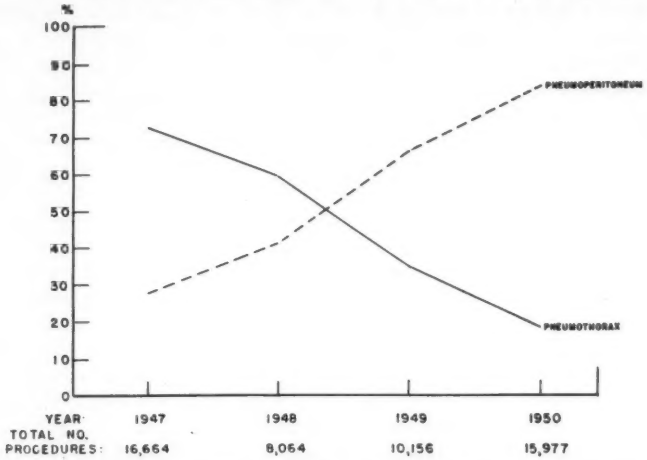


Figure 1. Percent of pneumothorax and of pneumoperitoneum treatments performed at Fitzsimons Army Hospital, 1947-50, based on total of both.

and indications for this procedure, to evaluate the use of streptomycin (SM) in patients treated with pneumothorax, and to offer an explanation of the growing decline in the use of this treatment.

CLINICAL MATERIAL AND METHODS OF EVALUATION

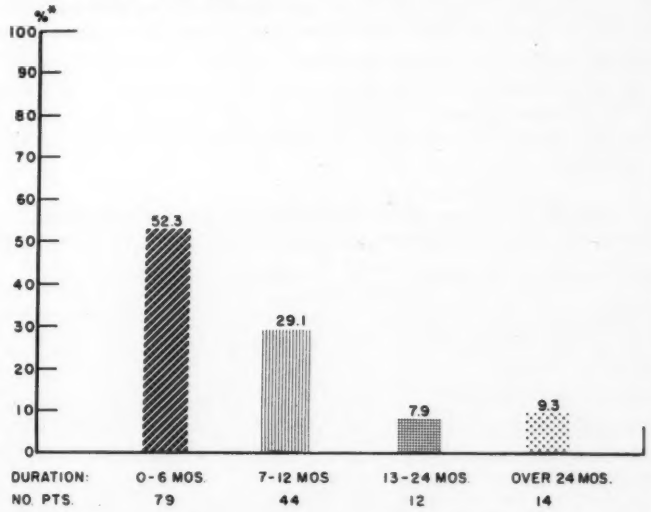
A total of 151 patients with pulmonary tuberculosis hospitalized at this hospital in 1948 and to whom artificial pneumothorax was given at some time during their treatment are included in this report. They were chosen from the records on file, which included those of all patients discharged from the hospital by reason of transfer, maximum hospital benefit, death, or irregular discharge during the entire year of 1948. No selection was made, except to exclude a few patients with insufficient data for analysis. The year 1948 had the following advantages regarding the study of pneumothorax: (1) a relatively large number of pneumothoraces were performed; (2) the number of patients receiving SM and not receiving SM was about equal. Prior to 1948 few

(8) Strug, H. L., and Shephard, R. M.: Complications of pneumothorax and pneumonolysis. Dis. Chest 19: 78-91, Jan. 1951.

patients, except those seriously ill or on special study projects received SM and since 1949 nearly all patients receiving temporary collapse have also had chemotherapy.

The patients were predominantly young white (86.8 percent) men (92.7 percent) whose ages ranged from 18 to 60 years, with 64.9 percent under 30, and 89.4 percent under 40. No instances of minimal tuberculosis were encountered. Ninety-six (63.6 percent) were moderately advanced and the remainder were far advanced. Cavitation was present in 137 (90.7 percent). Tubercle bacilli were demonstrated by smear or by culture of the sputum or gastric contents in nearly all of the patients at the onset of hospitalization, but at the time pneumothorax was induced 117 (77.5 percent) were positive, 32 (21.2 percent) were negative, and the remaining 2 were unknown. Of the 32 cases with negative sputum before pneumothorax 23 (71.9 percent) had been treated with SM.

The duration of disease prior to induction of pneumothorax is shown in figure 2, which indicates that in most patients the disease was of less than 1 year's duration.



*Based on total number of patients.

Figure 2. Patients grouped according to duration of disease at the time of induction of pneumothorax.

The patients were divided into clinical-pathologic types based on roentgenographic trend and duration of disease as shown in table 1. Nontuberculous complications of the disease were recorded when present. Only 6.6 percent of all patients had such complications, and none of these were of a nature to affect seriously the trend of the tuberculosis, nor the outcome of pneumothorax treatment.

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TABLE 1. *Distribution of patients by clinical pathologic types*

Type (1)	Number of patients	Percent
I	19	12.5
II and III	75	49.7
IV and V	35	23.2
Unknown	22	14.6
Total	151	100.0

(1) Type: I = New soft resolving (exudative); II = New soft poorly resolving (caseous); III = Mixed new lesions of types I and II; IV = Old hard poorly resolving (fibro cavernous); V = Mixed old and new.

Streptomycin was given before and/or during pneumothorax treatment in 90 (59.6 percent) of the patients. The other 61 either had no SM, or SM was given only after pneumothorax was abandoned. At the time these patients were treated SM alone was being given intramuscularly each day to most. A few received SM every 3 days, and several were given SM by aerosol inhalation. The duration of SM therapy varied in individual cases, but the predominant regimen at that time (1948 and previously) called for 120 days of continuous therapy. No attempt was made to select patients according to the SM regimen used, but all patients have been grouped according to the time relationship of SM therapy to pneumothorax (table 2).

TABLE 2. *Time relationship of SM therapy to pneumothorax*

Groups according to SM therapy	Number of patients	Percent	
No SM before or during pneumothorax	61	40.4	
SM before pneumothorax only	41	27.1	Total number of patients whose pneumothorax could have been influenced by SM 90 (59.6%)
SM during pneumothorax only	24	15.9	
SM both before and during pneumothorax	25	16.6	
Total	151	100.0	

Various factors such as temperature at onset of pneumothorax, complications of treatment, and additional operative procedures were taken from the available clinical records and correlated whenever possible with the outcome of pneumothorax treatment. Serial roentgenograms of nearly all patients were available, and in the rare case with no roentgenogram the descriptions available in the clinical records were used. After thorough study of all records each patient was placed

in 1 of the 3 following categories in respect to the outcome or trend of the pneumothorax treatment.

1. *Successful.* Pneumothorax was considered successful if all of the following criteria were met: (a) anatomically adequate collapse of the diseased lung; (b) follow-up period of more than 3 months; (c) either roentgenographic clearing, or stability with small inactive-appearing residuals of disease; (d) apparent cavity closure; (e) sputum conversion to negative for 3 months or more; (f) general condition of patient satisfactory; and (g) no serious complications of such a nature as to make the ultimate prognosis poor.

2. *Failure.* Pneumothorax was considered a failure if any of the following conditions existed: (a) inadequate collapse of the diseased lung caused by pleural symphysis or by adhesions not amenable to pneumonolysis; (b) abandonment of pneumothorax if for reasons of complications of the treatment or of the disease; (c) failure to convert the sputum or to close cavities in patients with 6 months or more follow-up after induction of pneumothorax; (d) unfavorable clinical or roentgenographic trend; (e) the necessity of adding other operative procedures, excluding pneumonolysis, to control the disease; or (f) failure to control both lungs with bilateral pneumothorax.

3. *Indeterminate.* The results of pneumothorax treatment were called indeterminate in patients who had less than 6 months' follow-up, in whom the general trend was favorable, but who did not meet the requirements set up for "successful" pneumothorax.

TABLE 3. *Duration of pneumothorax therapy*

Duration (months)	Number of patients			Total
	Successful	Failure	Indeterminate	
Less than 1	0	23	–	23
2 to 6	0	16	1 (AWOL)	17
7 to 12	5	10	–	15
13 to 24	3	2	–	5
25 to 48	1	3	–	4
Over 48	1	1	–	2
Total number of patients when pneumothorax was discontinued	10	55	1	66
Number in whom pneumothorax was continued when patient was lost to study	51(1)	10(2)	24	85
Total	61	65	25	151

(1) Average duration of pneumothorax in successful group when lost to study, 13.3 months.

(2) Average duration of pneumothorax in failure group when lost to study, 13.2 months.

The follow-up period (from induction of pneumothorax until the patient was lost to the study) was from 1 month to 20 years. The average duration of follow-up was 20.6 months for patients designated as "successful" or "failure," and less than 6 months for those called "indeterminate." Of all the patients 68.8 percent had follow-up periods of from 3 to 24 months.

Artificial pneumothorax administered to the patients in this study was of the negative pressure type with the degree of collapse varying from 15 to 50 percent in most. The duration of pneumothorax treatment varied from immediate abandonment in many of the "failure" group to an average of 13.2 months in the "successful" group when they were lost to this study. Table 3 shows this breakdown in detail. Few cases receiving satisfactory pneumothorax were subjected to therapeutic reexpansion within the time limits for follow-up achieved in this study, but most of the "failure" group had abandonment of pneumothorax relatively early.

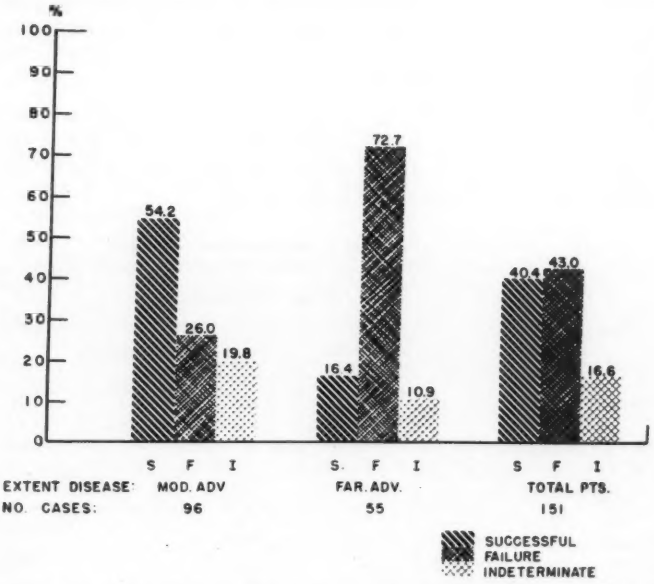

Figure 3. Results of pneumothorax treatment related to extent of disease.

EVALUATION OF RESULTS

The general results of the pneumothorax therapy as previously defined were correlated with the extent of disease (fig. 3), location of cavitation (fig. 4), the clinical pathologic types (table 4), duration of disease (fig. 5), temperature at time of induction of pneumothorax

TABLE 4. *Results of pneumothorax treatment related to clinical pathologic types*

Clinical pathologic type (1)	Total		Results					
			Successful		Failure		Indeterminate	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
I	19	100	11	57.9	5	26.3	3	15.8
II and III	75	100	26	34.7	35	46.7	14	18.7
IV and V	35	100	12	34.3	15	42.9	8	22.9
Unknown	22	100	12	54.5	10	45.6	0	0.0
Total	151	100	61	40.4	65	43.0	25	16.6

(1) See table 1 for definition of types.

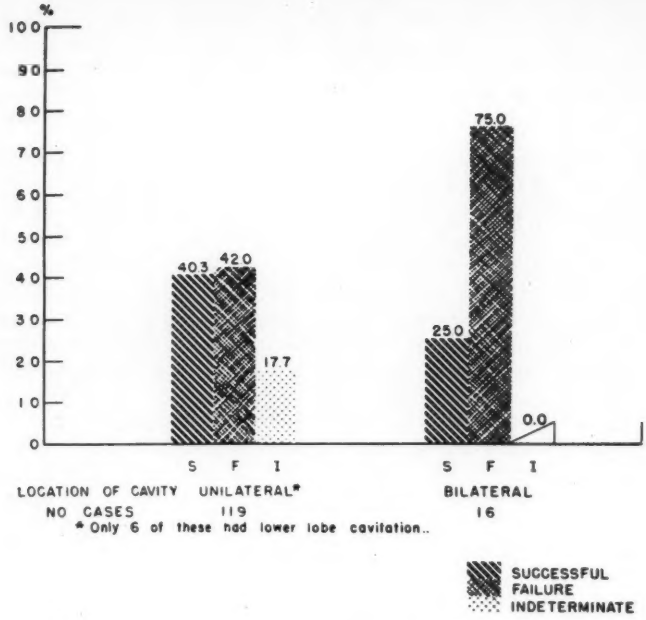

Figure 4. Results of pneumothorax treatment related to location of cavities.

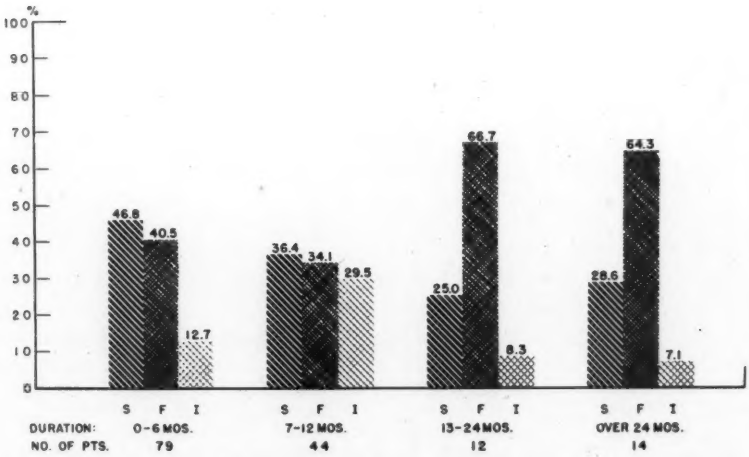

Figure 5. Results of pneumothorax related to duration of disease at time of induction of pneumothorax.

(table 5), and with SM therapy (table 6). The incidence of complications of pneumothorax and their relation to success or failure of the treatment was also determined. As shown in figure 3, the percent of successful pneumothoraces was very low in the patients with far advanced tuberculosis. Aycock and Keller *(9)* reported 86 percent success and 14 percent failure in the moderately advanced group; with 44.5 percent success and 55.5 percent failure in the far advanced group. When cavities were unilateral (fig. 4) the proportion of successful cases to failures were nearly equal, as it was in the entire series, but in the 16 patients with bilateral cavitation the ratio of success to failure was 1:3. Lower lobe cavitation was considered a strong contraindication to the use of pneumothorax at the time these patients were treated. Only 6 patients with lower lobe cavities were found in this series and the results in these were not sufficiently disparate to warrant reporting them separately. Poor results in lower lobe disease have been reported by others *(10)*.

When the outcome of pneumothorax was related to the clinical pathologic types the most significant finding was the higher percent of successful results and correspondingly lower incidence of failures in type I. There was little to be noted from the results in the other types, the percentage of failures being somewhat higher than that of the successes. That type I patients responded better than the other groups is not surprising, as this form of tuberculosis characteristically does well with bed rest alone or with drug treatment.

There appears to be a significant relationship between the success or failure of pneumothorax and the duration of the disease at the time this treatment was started. As shown in figure 5, when the disease was of less than 13 months' duration the results were slightly better than those for the entire series (fig. 3) but when the disease has been present for over 1 year failures outnumbered successful results about 2.5:1.

The danger of administering artificial pneumothorax to patients with acute febrile caseo-pneumonic disease has been recognized for many years. In the past, when pneumothorax was considered nearly indispensable in the armamentarium of therapy, induction was occasionally attempted in such patients in the hope that the pneumothorax would do more good than harm. Very few patients of the 151 in this group were febrile, but table 5 shows that pneumothorax in most of these few ended in failure.

In order to have a guide to judge results of pneumothorax as related to SM therapy each group as outlined in table 2 was further divided according to extent of disease (table 6). The ratio of moderate to far-ad-

(9) Aycock, G. F., and Keller, P. E.: Results of artificial pneumothorax; review of 530 cases. Am. Rev. Tuberc. 38: 277-291, Sept. 1938.

(10) Rothstein, E.: Poor results with artificial pneumothorax in lower lobe tuberculosis. Am. Rev. Tuberc. 59: 50-52, Jan. 1949.

TABLE 5. *Results of pneumothorax treatment related to temperature at start of pneumothorax*

Temperature	Total		Results					
			Success		Failure		Indeterminate	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Unknown	49	100	22	44.9	27	55.1	0	0.0
Normal	90	100	37	41.1	32	35.6	21	23.3
99 to 100° F.	10	100	2	20.0	4	40.0	4	40.0
100 to 101° F.	1	100	0	0.0	1	100.0	0	0.0
Over 101° F.	1	100	0	0.0	1	100.0	0	0.0
Total	151	100	61	40.4	65	43.0	25	16.6

TABLE 6. *Results of pneumothorax related to SM therapy*

Groups according to SM therapy	Extent of disease				Total		Results					
	Moderately advanced		Far advanced				Successful		Failure		Indeterminate	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
No SM before or during pneumothorax	40	65.6	21	34.4	61	100	30	49.2	28	45.9	3	4.9
SM before pneumothorax only	27	65.9	14	34.1	41	100	8	19.5	17	41.5	16	39.0
SM during pneumothorax only	12	50.0	12	50.0	24	100	10	41.7	14	58.3	0	0.0
SM before and during pneumothorax	17	68.0	8	32.0	25	100	13	52.0	6	24.0	6	24.0
Total	96	63.6	55	36.4	151	100	61	40.4	65	43.0	25	16.6

vanced disease was essentially the same in all groups except for the relatively higher proportion of far-advanced disease in the group receiving SM during pneumothorax only. The greatest percent of successes was in the group receiving SM both before and during pneumothorax therapy.

Streptomycin therapy has been greatly modified since 1948 *(11)*. With the newer regimens in which intermittent doses of SM are combined with para-aminosalicylic acid as with the older regimens, we have found it advantageous to treat patients with drugs for from 30 to 90 days prior to temporary collapse procedures when indicated, and to continue drug treatment for a total of at least 120 days.

TABLE 7. *Complications of pneumothorax related to success or failure of treatment*

Complication	Total		Number of patients		
	Number	Percent	Success	Failure	Indeterminate
Adhesions only	57	37.7	15	32	10
Pleural effusion plus adhesion	22	14.5	11	9	2
Tension cavity (with adhesions and/or effusion)	15	9.9	3*	12**	0
Pleural effusion only	12	7.9	8	2	2
Fibrothorax	4	2.6	2	2***	0
Empyema	2	1.3	0	2†	0
Obliterative pleuritis	2	1.3	1	1	0
Air embolism	2θ	1.3	0	2	0
Atelectasis	1	0.7	0	1	0
Subtotal	115	76.2	40	61	14
No complications	33	21.8	20	2	11
Unknown	3	2.0	1	2	0
Total	151	100.0	61	65	25

*Also had adhesions.
**All but one also had adhesions; 3 had effusion.
***One with adhesions; one with effusion.
†Died
θOne died; both had adhesions also and are included in that group.

(11) Tempel, C. W., et al.: Combined intermittent regimens employing streptomycin and para-aminosalicylic acid in treatment of pulmonary tuberculosis; comparison with daily and intermittent dosage schedules. Am. Rev. Tuber. 63: 295-311, Mar. 1951.

COMPLICATIONS OF ARTIFICIAL PNEUMOTHORAX

The complications of pneumothorax encountered in this series were frequent and varied. The most common complication was intrapleural adhesions, occurring in 94 (62.2 percent) patients and many times associated with other complications. The next most frequent complication was pleural effusion of all degrees occurring in 40 (26.5 percent). These also were usually associated with other complications. A breakdown of the various complications is shown in table 7 with the results of pneumothorax. It appears from the table that, with the possible exception of slight pleural effusion only, the presence of the complications decreases the probability of successful pneumothorax. SM was given during pneumothorax to 8 of the 15 patients who developed a tension cavity with 3 successful results and 5 failures. Patients the duration of whose disease was 6 months or less were analyzed according to the percent with adhesions found on induction of pneumothorax as related to whether SM was given prior to pneumothorax or not. The results of this analysis are shown in table 8. Giving SM prior to pneumothorax in patients whose disease was of short duration resulted in a significantly lower incidence of pleural adhesions. Pneumonolysis was attempted in 27 patients (28.7 percent of the 94 with adhesions). Sixteen of the 27 pneumonolyses were successful in that the adhesions could be severed, but, not all the successful pneumonolyses resulted in successful pneumothoraces. Pneumoperitoneum was added in the treatment of 18, thoracoplasty in 16, and lobectomy was performed on only 1 patient.

TABLE 8. *The effect of prior SM therapy on the presence of adhesions in disease of 6 months or less duration at time of pneumothorax*

	Total		Adhesions		No adhesions	
	Number	Percent	Number	Percent	Number	Percent
SM before pneumothorax	17	100	7	41.2	10	58.8
No SM before pneumothorax	52	100	33	63.5	19	36.5
Total	69	100	40	58.0	29	42.0

DISCUSSION

At this hospital the following contraindications to the use of artificial pneumothorax in the treatment of pulmonary tuberculosis have served as a guide for several years: (1) active endobronchial tuberculosis or bronchial stenosis, because of the danger of blocked drainage, atelectasis, or tension cavities; (2) acute tuberculous pneumonia, because of the danger of empyema, massive atelectasis, and early

spread of the disease; (3) extensive bilateral disease; (4) tuberculosis with a large nodular component (tuberculomata, or large fibro-caseonodose lesions); (5) extensive fibro-cavernous lesions, because of the likelihood of pleural symphysis, unexpansile lung, and the mechanical difficulty of closing such cavernous lesions by pneumothorax; (6) large peripherally located, or lower lobe cavities; (7) tuberculosis of the pleura; (8) massive atelectasis; (9) concomitant disease of the chest such as asthma, severe emphysema, and congestive heart failure; and (10) the presence of other nontuberculous disease, the nature and extent of which make operations on the chest impossible. These contraindications have been accepted fairly widely *(3, 5, 6, 9, 10)*.

TABLE 9. *The relation of certain contraindications* to the success or failure of artificial pneumothorax treatment*

Contraindications	Results					
	Total		Successful		Failure	
	Number	Percent	Number	Percent	Number	Percent
None	60	100	42	70.0	18	30.0
One contraindication	42	100	16	38.1	26	61.9
Two or more contraindications	24	100	3	12.5	21	87.5
Total	126	100	61	48.4	65	51.6

*The contraindications considered in this table are: (1) far advanced disease; (2) bilateral cavitation; (3) disease over 1 year's duration; and (4) elevation of temperature over 99° F.

The foregoing evaluation of results suggests several relative contraindications to the use of artificial pneumothorax in that failure of the procedure is much more frequent than success when these conditions prevail. These relative contraindications are: (1) far advanced pulmonary tuberculosis; (2) the presence of bilateral cavitation; (3) duration of disease over 12 months at the time of induction of pneumothorax; and (4) temperature of the patient in excess of 99° F. immediately prior to starting pneumothorax therapy. The significance of these 4 conditions is borne out in their statistical relationship to the success or failure of pneumothorax treatment as shown in table 9.

Because the successful management of pulmonary tuberculosis no longer depends on artificial pneumothorax so much as formerly, it seems wise to attempt the procedure only in the absence of any of the contraindications listed in the first or second paragraphs of this discussion, and only in the presence of moderately advanced active tuberculosis with unilateral upper lobe cavitation. The apparent cavity

closure or the sputum conversion which may frequently be observed during chemotherapy should not induce a false sense of security. Roentgenographic and sputum relapse are not uncommon in these patients following completion of drug treatment *(11)* and temporary collapse measures are usually indicated to maintain and to further the gains of the rest and drug regimens.

The reasons for the growing decline in the use of artificial pneumothorax may be summarized as follows: (1) pneumothorax is a dangerous procedure from the standpoint of both early and late complications; (2) the contraindications to the use of pneumothorax are numerous; (3) with the increased use of other temporary and permanent operative procedures, the need for pneumothorax in the management of tuberculosis has diminished; and (4) streptomycin and other tuberculostatic drugs have decreased the necessity for temporary collapse measures.

SUMMARY

Artificial intrapleural pneumothorax in the treatment of pulmonary tuberculosis which enjoyed widest usage from the early 1920's to the early 1940's has recently shown a decrease in popularity. In an evaluation of 151 patients with pulmonary tuberculosis who received artificial pneumothorax treatment it was found that: (1) streptomycin was given to 59.6 percent; (2) the results of treatment in the entire series were successful in 40.4 percent; unsuccessful in 43 percent; and indeterminate in 16.6 percent; (3) only 16.4 percent of the patients having far-advanced disease had successful pneumothoraces; (4) bilateral cavitation was accompanied by failure of treatment with pneumothorax in 75 percent of such patients; (5) of all clinical pathologic types, new soft resolving disease (exudative) responded best to pneumothorax; (6) failure of treatment with pneumothorax occurred in two-thirds of all patients whose disease was of over 1 year's duration at the time pneumothorax was started; (7) fever at time of induction of pneumothorax was associated with a large proportion of treatment failures; (8) best results were obtained in the group receiving streptomycin both before and during pneumothorax therapy; (9) complications of pneumothorax treatment were frequent and varied; (10) the presence of complications was associated with a low percent of successful pneumothoraces; and (11) the following relative contraindications were added to the list of contraindications previously accepted: (a) far advanced disease, (b) bilateral cavitation, (c) tuberculosis of over 1 year's duration, and (d) elevation of temperature over 99° F. at the time of starting pneumothorax.

The value of artificial pneumothorax is still acknowledged for the limited number of patients with pulmonary tuberculosis in whom the indications for this procedure exist without detectable contraindications.

BOOK REVIEW

Report to the Combined Chiefs of Staff, by the Supreme Allied Commander South-East Asia 1943-1945, *Vice-Admiral The Earl Mountbatten of Burma,* K. G., P. C., G. C. S. I., G. C. V. O., K. C. B., D. S. O. 280 pages; illustrated. Philosophical Library, New York, N. Y., publisher, 1951. Price $12.

Careful study of the text reveals no mention of the employment of the Medical Department in any given campaign. The general picture as given in Annexure 5 concerns, for the most part, the function of a very high-level group, and contains little of value to the medical officer who is charged with actual casualty care. The activities of the Medical Advisory Group, as related in Annexure 5, appear in many ways to duplicate the normally assumed duties of the senior medical officers on the various high-level staffs.

The reduction in sickness rate cited in this report which tacitly implies a high degree of the effectiveness of preventive measures, does not take into consideration the possibility that the nature of the campaigns conducted in 1945 led to less exposure to disease because of a more stabilized situation. Furthermore the premise, expressed under discussion of tropical disease in paragraph 60 and page 15, that our forces would take advantage of the worst conditions to the end that the Japanese would suffer more, is not a valid one. It has never been a policy of this country to accept increased casualties, whether battle or nonbattle, if there was any way of avoiding them. It is doubtful that the resistance of our troops to tropical disease would enable them to fare better than the Japanese troops who had been operating in the tropics for a longer period, regardless of any preventive measures used by our own men.

This manuscript contains little of value to the Medical Department, and in glossing over the tremendous problems involved in care and evacuation of battle casualties, and the great loss of efficiency of the fighting elements caused by disease, it actually performs a disservice to the Medical Department. I realize that this is a military operations report, but I believe that in touching so lightly on the Medical Department's participation, an opportunity for a vast contribution to the conduct of jungle operations has been lost.

—*Capt. E. R. Hering, MC, U. S. N.*

Acute Porphyria With Intestinal Carcinoma[1]

Charles D. Chaput, *Lieutenant, MC, U. S. N. R.*

Joseph J. Timmes, *Commander, MC, U. S. N.*

SINCE Günther (2,3) in 1911 first described hematoporphyria, following Hoppe-Seyler's clear description of a porphyrin, many articles on porphyria have appeared. In some of these (4-10), the abdominal symptoms characterized by cramps, distention, and constipation have been stressed and it has been further pointed out that these signs and symptoms are caused by spasm in segments of the gastrointestinal tract. It has also been shown that unnecessary laparotomies had been performed on patients with this disease because of a mistaken preoperative diagnosis. The following case is reported because a malignant lesion of the gastrointestinal tract was found in association with acute porphyria. Because of the emphasis in the literature on spasm as a cause for the abdominal symptoms in acute porphyria, radical surgical therapy was considerably delayed. In addition, the case is also of interest because of the possible relationship between carcinoma and acute porphyria.

CASE REPORT

A 35-year-old woman was admitted to this hospital on 16 February 1951 complaining of abdominal pain and constipation. Two months

(1) U. S. Naval Hospital, Newport, R. I.

(2) Günther, H.: Die Hamatoporphyrie. Deutsches Arch. f. klin. Med. 89, 1911.

(3) Günther, H.: Hamatoporphyrie. In Schittenhelm, A. (editor): Enzyklopadie der inneren Medizin. Handbuch der Kraukheiten des Blutes und der blutbildenden Organe. Volume II. Julius Springer, Berlin, 1925. p. 622.

(4) Chandler, F. G., et al.: Clinical porphyrinuria, with report of case of acute idiopathic type. Brit. M. J. 2: 1173-1180, Dec. 16, 1939.

(5) Fuller, R. H.: Acute porphyria. U. S. Armed Forces M. J. 1: 214-217, Feb. 1950.

(6) Glenn, D. L.: Review of porphyria. Papers Carle Hosp. Clinic, Urbana, Ill. 3: 35-40, 1950.

(7) Goldman, A. M., and Kaplan, M. H.: Acute porphyria. Ann. Int. Med. 34: 415-427, Feb. 1951.

(8) Porphyria. Bull. Univ. Minnesota Hosp. 22: 1950.

(9) Petrie, E.: Case of acute porphyria. Brit. M. J. 1: 926-929, May 15, 1948.

(10) Prunty, F. T. G.: Acute porphyria; investigations on pathology of porphyrins and identification of excretion of uroporphyrin I. Arch. Int. Med. 77: 623-642, June 1946.

prior to admission she first noted constipation which had gradually increased in severity. At the onset of the constipation she was able to move her bowels with the aid of mild laxatives but gradually laxatives or enemas had no effect. On the day preceding her admission to the hospital she noted a constant desire to move her bowels without success and for the first time passed a small amount of dark red blood per rectum. During the previous month she had noted a gradual onset of lower abdominal cramps which had progressively increased in severity. Over a 10-year period she had gradually lost 30 pounds.

Physical examination on admission revealed a poorly nourished woman in acute distress with a temperature of 98.8° F., a pulse rate of 108, and a respiratory rate of 24. Her abdomen was distended and tympanitic throughout. Only occasional faint peristaltic waves were audible. Tenderness was present in both lower quadrants of the abdomen without muscle guarding. The leukocyte count on admission was 24,100 with 88 percent neutrophils. A roentgenogram of the abdomen revealed moderate distention of the colon with gas. A urine specimen voided on admission was noted to be cherry red and, when examined by the Watson-Schwartz method, was found to be positive for porphobilinogen. Later, on the first hospital day, the patient again voided cherry-red urine which was again positive for porphobilinogen. On the basis of the above findings a diagnosis of acute porphyria was made. Accordingly she was treated conservatively with a soft diet, vitamins, and demerol hydrochloride (meperidine hydrochloride) for abdominal pains. During the first 5 hospital days all urine specimens were positive for porphobilinogen but repeated examinations of the urine thereafter failed to reveal the presence of this substance.

During the first 7 hospital days the patient's abdomen gradually became more distended. She was able to pass small amounts of flatus per rectum during the first few days. On the seventh hospital day the abdominal cramps became severe, flatus was no longer passed per rectum, and she began to vomit. A roentgenogram of the abdomen on this day revealed marked distention of the colon exclusive of the sigmoid and rectum. A sigmoidoscope was passed a distance of 25 cm. and failed to reveal the presence of an organic lesion.

On 23 February a cecostomy was performed without exploration of the rest of the abdomen as it was feared that the tremendously dilated cecum might become perforated. Following cecostomy the patient felt much better although she continued to have abdominal pain and backache. She also passed some flatus and an occasional small stool per rectum. A barium enema was obtained and, although the patient was unable to retain the fluid very well, the barium passed to the mid-descending colon without apparent obstruction. The patient's abdomen became soft when all distention was relieved and large amounts of liquid fecal matter passed through the cecostomy stoma. When the cecostomy did not function well the abdomen became distended and the abdominal cramps and backache became more severe.

On 12 April barium was injected through the cecostomy tube and a completely obstructing lesion of the proximal descending colon was demonstrated with irregularity of the mucosa suggestive of adenocarcinoma of the colon. The patient was then prepared for operation with the administration of 1,500 cc. of whole blood and the use of bowel antiseptics. An exploratory laparotomy revealed a firm, nodular mass 8 cm. long in the proximal descending colon, involving the entire circumference of the bowel with extension through the serosa. There were also numerous seedlike transplants throughout the entire peritoneal cavity involving the serosa of the intestines, the parietal peritoneum, and the omentum. Microscopic examination of one of the omental masses proved it to be an adenocarcinoma. Because the lesion was beyond hope of surgical cure a palliative transverse colostomy was performed. In spite of the presence of acute porphyria it is noteworthy that the patient withstood the surgical procedures well. Postoperatively her course was gradually downhill and she died on 16 May. Permission for an autopsy was not granted.

DISCUSSION

Acute porphyria is a metabolic disease and, as with any other metabolic disease, it may be associated with some other organic pathologic process. Although spasm of the gastrointestinal tract is usually the cause of abdominal symptoms in acute porphyria, the abdominal complaints have a separate and distinct cause as in the case presented. In general, operation is to be avoided when porphyria is present because these patients do not tolerate surgical procedures or anesthesia well, but when an operation is definitely indicated it should be performed and, as in the case presented, may be tolerated quite well. Although we are unable to find any similar cases reported in the literature, it is probable that others too may overlook another organic lesion associated with porphyria.

This case is also of interest because of the possible relationship between porphyria and carcinoma. Although the relationship between the two conditions is not well understood, a number of experiments have been performed which suggest that such a relationship may exist. Figge *(11)* and other observers *(12, 13)* have noted red fluorescence of the harderian glands of mammary-cancer-susceptible mice which did not exist in mammary-cancer-resistant mice. This red fluorescence was found to be caused by the presence of porphyrins in the harderian glands. Furthermore, Figge et al. *(14)* noted that when hematopor-

(11) Figge, F. H. J.: Relationship of pyrrol compounds to carcinogenesis. Research Conf. Cancer (1944). 117-128, 1945.

(12) Hueper, W. C., and Figge, F. H. J.: Porphyrin excretion of harderian glands in its relation to actinic carcinogenesis in hairless rats. Cancer Research 5: 328-330, June 1945.

(13) Bittner, J. J., and Watson, C. J.: Possible association between porphyrins and cancer in mice. Cancer Research 6: 337-343, July 1946.

(14) Figge, F. H. J.; Weiland, G. S.; and Manganiello, L. O. J.: Cancer detection and therapy; affinity of neoplastic, embryonic, and traumatized tissues for porphyrins and metalloporphyrins. Proc. Soc. Exper. Biol. & Med. 68: 640-641, July-Aug. 1948.

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phyrins were injected into mice with tumors and traumatized tissues that the porphyrins concentrated in tumors, healing wounds, and embryonic tissues. Apparently, porphyrins have an affinity for growing tissues. On the basis of this data it may be assumed that some relationship exists between these two diseases although at present complete proof is lacking, and the cause and effect relationship has not been determined.

BOOK REVIEWS

Fever Therapy, by *H. Worley Kendell,* M. D., F. A. C. P., Professor of Physical Medicine and Rehabilitation, University of Illinois Research and Educational Hospitals, Chicago, Ill. Publication Number 80; American Lecture Series. A Monograph in American Lectures in Physical Medicine. 101 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $2.

This is an excellent compendium, written by an authority, both in research and in the technic of the administration of fever therapy. This small booklet encompasses the subject including the selection of patients as well as the management of their treatment, bringing up to date the most valuable written material on fever therapy together with its indications. It contains an especially fine short summary as to the effectiveness, as well as the limitations, of fever therapy. This is an excellent manual and is indispensible for those who desire to use this therapy.—*Col. E. M. Smith, MC, U. S. A.*

Treatment of the Nephrotic Syndrome, by *Lee E. Farr,* M. D., Chairman, Medical Department, Brookhaven National Laboratory; Physician-in-Chief, Brookhaven National Laboratory Hospital, Upton, Long Island, N. Y. Publication Number 64, American Lecture Series. A monograph in American Lectures in Circulation. 61 pages, Charles C Thomas, Publisher, Springfield, Ill., 1951. Price $1.75.

This easily readable monograph mentions a wide variety of modalities which have been used in the symptomatic treatment of the nephrotic syndrome. It is necessarily sketchy in the coverage of individual items but the author is definite in his recommendations and condemnations. In chapter 3 the discussion of the treatment of the *renal lesion* is divided into three aims: (1) to maintain maximal renal blood flow at all times, (2) to decrease the total work load of the kidney to a minimum, and (3) to correct biochemical deficiencies or to ameliorate the effects of excesses due to retention of certain substances. In chapter 6, the use of cortisone, ACTH, and nitrogen mustard not only to alleviate the edema but also in the hope of effecting a cure is mentioned. This book is recommended to anyone interested in bringing his working knowledge of the treatment of the nephrotic syndrome up to date.

—*Commander J. F. Richardson, MC, U. S. N.*

Holding and Transport Medium for the Isolation of Shigella[1]

Arvey C. Sanders, *Lieutenant Colonel, MSC, U. S. A.*
K. Okabe
R. P. Elrod (2)
Robert L. Hullinghorst, *Lieutenant Colonel, MC, U. S. A.*

ALTHOUGH several enrichment and holding media which adequately serve in the isolation of Salmonella have been devised none have proved outstanding in the recovery of Shigella. In our experience no medium has been satisfactory even in the transport of fecal material to the laboratory, much less to serve as a worthwhile holding or enrichment medium. Bangxang and Eliot (3) compared several of the older holding media with desoxycholate citrate combinations. They found that 1 percent citrate and 0.5 percent desoxycholate in a buffered saline solution was superior to a 30 percent glycerol-saline, 3 percent normal sodium hydroxide, 10 percent ox bile solution in preserving the viability of various species of Shigella. They were also able to locate healthy carriers who had not been detected when glycerin preservatives were used. It was suggested also that mandelic acid solutions might prove useful in this regard.

Brodie (4) has studied extensively a modified Leifson medium for the isolation and enrichment of dysentery bacilli. From a total of 93 positive specimens obtained by the combined efforts of direct plating on his rosolic acid citrate agar and by enrichment in a modified Leifson fluid medium, citrate neutral red (CNR) broth, 68 (73.1 percent) were obtained by direct plating while only 47 (50.5 percent) were recovered by

(1) 406th Medical General Laboratory.
(2) Deceased.
(3) Bangxang, E. N., and Eliot, C. P.: Investigation of preserving solutions for recovery of dysentery bacilli from fecal specimens. Am. J. Hyg., Sect. B. 31: 16-30, Jan. 1940.
(4) Brodie, J.: Modified Leifson media for isolation of B. dysenteriae and pathogenic members of colon-typhoid group. J. Path. & Bact. 54: 499-509, Oct. 1942.

enrichment methods. Of the latter, however, 25 were obtainable only after enrichment, being undetected by direct plating. Substituting rosolic acid for neutral red in the enrichment fluid appeared to produce a more efficient medium, citrate rosolic acid (CRA) broth. In a series of 15 positive dysentery stools, the CRA enrichment medium yielded 12 positive isolates. Only 9 were obtained by direct plating and only 7 were recovered from the CNR enrichment. The CRA broth recovered 4 not obtained by other methods whereas 3 were missed by this means. It has been recently reported by Brodie *(5)* that his CRA broth was more effective when a shallow layer (2 mm.) was used than when a deeper layer was used.

The medium used in most laboratories for transporting and holding fecal specimens is the buffered glycerol-saline medium *(6)*. This method has been recommended by Galton et al. *(7)* and Ewing and Edwards *(8)*. It has been our experience that this medium is only moderately satisfactory for the isolation of Shigella when heavily seeded with fecal material and is of little value in preserving rectal swab specimens unless followed by enrichment for the detection of Salmonella.

In view of the repeated observations that bacto SS agar is an excellent medium for the primary isolation of Shigella from fecal material, it seemed worthwhile to test this agar as a possible holding and transport medium. At the same time it was deemed advisable to test the efficiency of combined components of the SS formula and also to compare buffered glycerol-saline broth. The CNR broth of Brodie with modification was used. Inasmuch as the main coliform inhibiting constituents of the Leifson formula are citrate and desoxycholate the various modifications of Bangxang and Eliot were not used. It was also decided to use one of the standard Salmonella enrichment media in the test. Selenite broth was the medium selected. The purpose of the experience was primarily to ascertain which medium was the most suitable for holding and transporting sûspected fecal specimens to the laboratory for the isolation of Shigella organisms. Enrichment was not considered.

MEDIA USED

Seven media were used in this comparative study.

1. Bacto SS agar plates. These were made fresh daily.

2. Bacto SS agar slants. About 12 ml. of freshly prepared SS agar was placed in sterile 22 ml. screw-capped vials and slanted to produce the maximum surface.

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(5) Brodie, J.: Shallow-layer fluid enrichment method for intestinal pathogens. J. Path. & Bact. 61: 120-121, Jan. 1949.

(6) Felsenfeld, O.: Two surveys of methods used by public health laboratories for the examination of stool specimens for Salmonellae, Shigellae, and Protozoa. Pub. Health Rep., Wash. 65: 1075-1083, Aug. 1950.

(7) Galton, M. M.; Hardy, A. V.; and Mitchell, R. B.: The public health laboratory diagnosis of enteric infections. Am. J. Trop. M. 30: 77-90, Jan. 1950.

(8) Ewing, W. H., and Edwards, P. R.: Selection of Salmonella and Shigella cultures for serological classification. CDC Bull., Atlanta 9: (5) 1-8, 1950.

3. CNR broth. This medium was the desoxycholate citrate medium of Leifson devoid of agar. It differed from Brodie's CNR broth in the substitution of pork infusion and difco proteose No. 3 for the serum peptic digest lemco broth and sodium desoxycholate for sodium taurocholate. Two milliliters were dispensed in 22 ml. screw-capped vials.

4. CRA broth. This was identical to the CNR broth substituting CRA for the neutral red, in amounts of 0.5 ml. of a 1 percent solution in absolute alcohol for each 100 ml. of broth. It likewise was dispensed in 22 ml. vials in quantities of 2 ml.

5. SS broth. The standard bacto SS agar formula minus the agar. This was dispensed in the same manner as the CNR broth.

6. Glycerol-saline broth. This buffered preservative was made up according to the formula given by Galton et al. (7) and dispensed in 12 ml. quantities in 22 ml. screw-capped vials.

7. Difco selenite broth enrichment medium as described by Leifson (9), dispensed in the same manner as the glycerol-saline broth.

Six of these omitting the CRA broth of Brodie were used for the first group of specimens. The omission of CRA broth was occasioned by the fact that we were unaware of the medium and the latest shallow layer technic until the project was underway. The CRA broth was then compared with the direct SS agar plate and the SS agar slant, the latter holding medium having shown the greatest promise during the culturing of the first 100 specimens.

SOURCE OF MATERIAL AND METHOD

One hundred and sixty-four fecal specimens were obtained from Japanese patients hospitalized in the Tokyo area. The clinical diagnosis in each case was dysentery. Each medium was inoculated with a cotton swab which was heavily impregnated with the specimen in question. The SS agar plate was streaked in such a manner as to insure isolated colonies. No attempt was made to achieve isolation on the SS slant, but rather the material was smeared heavily on the surface. Each of the liquid media received a generous portion of the fecal material. All of the media were inoculated at the hospital and returned to this laboratory within a few hours. The SS agar plates were incubated immediately on return to the laboratory at 37° C. until the following morning. All other media were held overnight at room temperature and then incubated for from 16 to 24 hours at 37° C.

Transfer was made from test media to fresh MacConkey agar plates. In the case of the SS slant the total growth was mixed and then a part of the mixture streaked for isolation. After proper incubation the MacConkey plates were examined for nonlactose fermenting colonies. Four or five colonies from each SS and MacConkey agar plate were in-

(9) Leifson, E.: New selenite enrichment media for isolation of typhoid and paratyphoid (Salmonella) bacilli. Am. J. Hyg. 24: 423-432, Sept. 1936.

oculated into a tryptose-phosphate booster broth containing 1 percent sucrose and lactose with brom cresol purple as an indicator. After 4 hours incubation those "booster" broths not showing definite acidity were inoculated into Kligler's iron agar plus 1 percent sucrose, Simmon's citrate agar and motility agar. Those cultures which were definitely acid were discarded. After inoculation, incubation was carried out at 37° C. for from 16 to 24 hours. The remaining alkaline "booster" broths were reincubated similarly. At the end of the period of incubation the booster broth was used to test for indol with Kovac's reagent. From these biochemical reactions suspected Shigella and Salmonella isolates were kept and the remainder discarded. No Salmonella were isolated from the first 100 specimens although the yield of *Paracolobactrum intermedium* was fairly high. The latter have not been tabulated in this article. Those which showed Shigella reactions were checked in polyvalent Shigella serum and, if positive, subsequently identified as to species and type.

RESULTS

A total of 100 fecal specimens from as many patients were cultured over a 3-week period in June and July 1950. Forty-six Shigella were recovered by all media, i. e., SS agar plates, SS slants, SS broth, CNR broth, glycerol-saline broth, and selenite broth. The direct plating on SS agar yielded 43 positives. This method failed to recover Shigella from 3 specimens found positive in 1 of the other media. The first of these was recovered from the SS slant, glycerol-saline broth and selenite broth, the second from CNR broth only, and the third from CNR broth and the glycerol-saline broth. Thus 93.5 percent of recoveries were made by direct plating (table 1). Only the SS slant yielded more than 50 percent positive isolates. Definitive typing of the Shigella isolated showed 9 to be *S. flexneri* I, 27 *S. flexneri* II, 4 *S. flexneri* IV, 7 *S. flexneri* (X) and 5 *S. sonnei.*

TABLE 1. *Recovery of Shigella from 100 fecal specimens by direct plating and 6 holding media*

Medium	Number of isolates	Percent of total positive isolates
All media	46	100.0
SS agar plates	43	93.5
SS agar slants	36	78.2
Glycerol-saline broth	23	50.0
SS broth	21	45.7
CNR broth	19	41.3
Selenite broth	11	23.9

The holding qualities of the SS slant were tested further by seeding fresh fecal specimens with Shigella, streaking the slant, and holding at room temperature for 1 week. Six slants were streaked with a specimen seeded with *S. flexneri* II and 6 with feces seeded with *S. sonnei* phase I. The slants were incubated at 37° C., and each day a portion of the growth was streaked on MacConkey's plates and suspected colonies treated as mentioned previously. It was found that the medium maintains Shigella, under these conditions, for 1 week at least. On the sixth day, for example, 11 of the 12 slants were positive, although on the fifth day only 7 were positive. The latter figures also prevailed for the seventh day. The inconsistent results can be best explained by the fact that growth was not mixed before restreaking, but rather a random loop of material was taken for the inoculum.

The effect of the age of the SS slant was also investigated. One set of bottled slants was kept at room temperature and another in the ice box at 4° C. At the end of 3 days 6 slants were inoculated with fecal material artificially seeded with *S. flexneri* II and 6 with material containing *S. sonnei.* After overnight incubation at 37° C. it was possible to reisolate the type II organisms from 5 of the 6 slants and *S. sonnei* from all 6.

A set of slants which had been held 7 days at room temperature and another set held in the ice box for the same time were tested in the same manner. *S. flexneri* II, was not recovered from any of the slants held at room temperature but *S. sonnei* was recovered from 3 of 6 slants. The set which had been held in the ice box before inoculation yielded type II organisms in all but one instance and *S. sonnei* from all 6 slants.

In further evaluation of Brodie's CRA broth, SS agar plates and bottled SS agar slants a total of 64 suspected stool specimens were tested. Of these 41 were positive for Shigella by direct plating, while 29 were detected on replating to MacConkey's from the CRA broth and 30 were recovered from the SS slant. No positives were detected by CRA broth or the SS slant that were not accounted for by direct plating. Using CRA broth Shigella were recovered from 3 specimens which were negative using the SS slant, while 4 were positive using the latter which were negative using the former.

On definitive typing 31 were *S. flexneri* II (W), 5 *S. flexneri* I (V), 3 *S. flexneri* IV (Boyd 103), and 2 *S. sonnei.*

Salmonellas were recovered from 3 specimens. These consisted of 2 *S. paratyphi* A and 1 *S. typhosa* isolated by direct plating, whereas 1 *S. paratyphi* A and the typhoid culture were recovered with the CRA broth. The SS slant yielded only 1 of the 2 *S. paratyphi* A isolates.

DISCUSSION

From the results compiled in this study there appears to be no substitute for direct plating for the isolation of Shigella. Nevertheless,

greater success has been attained by use of SS agar slants and CRA broth, than by the frequently used buffered glycerol-saline broth. The success of the SS agar slant in recovering 75 percent of the Shigella from proved positive specimens, is apparently a reflection of the success of the medium when used in the plate. The solid state of the medium serves, it would seem, some worthwhile purpose, as the same formula minus only the agar (SS broth) was less successful. There was, of course, massive overgrowth by other fecal organisms in many instances. The percentage of recoveries was approached only by Brodie's CRA broth (table 2). As pointed out by Halbert *(10)* there are many coliform organisms which produce antibiotic substances which act against Shigellas. The agar may prevent the ready diffusion of such substances, a condition not provided by a liquid medium. The use of SS agar in a sturdy screw-capped vial provides a means by which a specimen may be transported easily to the laboratory.

TABLE 2. *Comparison of SS agar slants, CRA broth, and SS agar plates in recovering Shigella*

Medium	Specimens	Number of Shigella isolates	Number of Salmonella isolates	Recovered (percent)
SS agar plates	64	41	3	100.0
SS agar slants	64	30	1	70.5
CRA broth	64	29	2	70.5

The chief difference between CNR broth and Brodie's CRA broth is that a special serum peptic digest and sodium taurocholate are used in the CRA formula and proteose No. 3 peptone and sodium desoxycholate are used in the CNR broth. Nevertheless, the recovery rate is as determined by Brodie (50.5 percent) and that reported here (41.3 percent) for CNR broth are within limits not too widely divergent. The replating medium used in this study was MacConkey's agar; Brodie used CRA agar in his study.

The failure of selenite broth was not unexpected inasmuch as the medium was devised to aid in the recovery of Salmonella, but the relatively poor results obtained with buffered glycerol-saline solution, was not foreseen. It has been recommended by others as the preserving medium of choice *(6)*. Certainly the significant differences obtained between it and direct plating indicate that too much confidence has been placed in the procedure. Our attempts to isolate Shigella from rectal swab cultures which have been preserved in buffered glycerol-saline broth *(7)* have resulted in almost total failure. The plating of

(10) Halbert, S. P.: Relation of antagonistic coliform organisms to shigella infections; survey observations. J. Immunol. 60: 23-36, Sept. 1948.

swabs so preserved yielded extremely poor results, often showing no growth. We believe that this may be due to the transfer of enough of the glycerine solution to the plate effectively to inhibit growth. This is obviated, for Salmonella at least, by first transferring swabs to a satisfactory enrichment medium.

BOOK REVIEW

Hypnoidal Psychotherapy, by *Margaret Steger,* Ph. D., Foreword by *Frederick Bergstrom,* M. D. 150 pages. Froben Press, Inc., New York, N. Y., publisher, 1951. Price $3.50.

This book presents a method of therapy using the period between normal sleep and wakefulness to exert constructive, suggestive measures on patients with emotional illnesses. The therapeutic use of this state of semisomnolence preceding natural sleep is designated "hypnoidal psychotherapy" and differs from the hypnotic state in that it is a normal phase in contrast to hypnosis which is abnormal and may aggravate emotional conflicts. The oscillation between sleep and wakefulness is repeatedly emphasized as an ideal therapeutic medium for suggestive therapy and the author makes the statement that only material consciously understood and accepted by the patient can be used during the hypnoidal state. This immediately raises the question: What can be the advantage of the so-called hypnoidal state? To which the author replies that during the hypnoidal state suggestive influences and comments are more potent. The author places much emphasis on frustration as a source of mental conflict and proposes the theory that the initial frustration may have been the fear of suffocation during periods of oxygen lack by the newborn infant.

The comments on acquired and innate homosexuality are rather naive and the reports of successful treatment with hypnoidal psychotherapy of homosexuality, and alcoholism are unconvincing. The book contains a brief but interesting discussion on ego-psychology, the origin of psychotherapy, and attempts to define the term psychotherapy. Throughout the book the case reports are few and those given are incomplete. The author's discussion of the rationale of psycho-gymnastics and the use of recorded hypnoidal interviews by the patient without direction or supervision of the therapist during the periods of relapse after completion of hypnoidal therapy is difficult to accept and is not in agreement with sound psychotherapeutic principles.

—*Commander C. H. Bagenstose, MC, U. S. N.*

BOOK REVIEW

Therapy of Dermatologic Disorders, Including a Guide to Diagnosis and a Dermatologic Pharmacopeia, by *Samuel M. Peck,* B. S., M. D., Dermatologist to the Mount Sinai Hospital, New York City; Associate Clinical Professor of Dermatology, Columbia University, New York City; Medical Director (R) Inactive U. S. P. H. S., and *George Klein,* M. D., Associate Visiting Dermatologist, Morrisania City Hospital, New York City; Acting Adjunct, Mount Sinai Hospital, New York City; Assistant Clinical Professor of Dermatology, New York Medical College. 383 pages. Lea & Febiger, Philadelphia, Pa., publishers, 1951. Price $6.50.

This book offers the only available dermatologic pharmacopeia. As such it will be of benefit to everyone interested in treating skin and venereal diseases. The drugs are arranged in alphabetic order and described with uses, dosages, and precautions. Useful prescriptions using the drugs are included. It is noted that ten times the usually accepted dosage of the active ingredients of lotio alba (N. F. IX) are given and this should be corrected in future editions.

The authors have included a short discussion of dermatologic disorders with suggestions for therapy. In most instances this represents their personal preferences for treatment. Where they have adhered to this policy the treatment suggested is clear and simple, but unfortunately in many instances they have listed all the available treatments without a definite statement as to their own recommendations. They have even included treatments which were experimental at the time of publication and since proved worthless or dangerous. Among such treatments should be included undecylenic acid for psoriasis and the use of crude coal tar and sulfathiazole for sensitizing the skin to light in the treatment of acne vulgaris. The authors did state that undecylenic acid had little if any beneficial effect on their patients.

There is a brief but well written section on physical therapeutic methods. There is a chapter on the removal of undesirable medical stains of the skin and clothing that will be frequently consulted. There is a section on topographic (regional) diagnosis and a table of the most common skin disorders, but it is doubtful if these will be of much aid to the beginner for whom they are intended. The book will be useful principally as a reference book for dermatologists but could be a helpful guide for all doctors who wish to treat skin diseases.

—*Maj. E. F. Gudgel, MC, U. S. A.*

A Test for Monocular Malingering

James F. Kleckner, *Lieutenant, MC, U. S. N. R.* (1)

IN A TIME of national crisis, many men called to active service with the Armed Forces become dissatisfied with the circumstances in which they find themselves. The service physician is plagued by a flood of real and imaginary disabilities as well as by a large number of exaggerated disabilities which may be difficult (or even impossible) to evaluate properly. Ocular malingerers have been variously estimated at from 0.5 to 3 percent of all inductees. The exact proportion is uncertain because it is impossible to determine how many of these malingerers remain undetected. It is certain, however, that unless malingering is kept at a minimum by rapid detection, the armed services can, and will, lose heavily in manpower and financial resources. It is important to emphasize the word rapid because the time spent by the physician in detecting feigned illness is not available for the treatment of disease in those who, in many ways, are most deserving of his attention.

The simple and easily constructed screening device herein described aids in the quick detection of a certain proportion of ocular malingerers. Although the idea is not new, no exact measurements have appeared in the recent literature. The principle of the test used is to have the patient observe written material through a small opening in a screen placed at such a distance that he is able to see the center of the lines with both eyes, the right side with the left eye, and the left side with the right eye. The Harman (2) apparatus uses this principle, but it has the disadvantage of having very little overlap in the field of vision of the two eyes and a small aperture. It is, therefore, limited as to the amount of reading material which can be seen by each eye. In addition, physiologic diplopia is easily observed and the shift from one eye to the other in reading is more easily detected by the examinee. Remy in 1901 devised a similar apparatus which he called a diploscope, but this instrument has been largely discarded because it requires convergence and is, therefore, less satisfactory than other tests which are available.

(1) U. S. Naval Hospital, San Diego, Calif.

(2) Harman, B.: Tr. Ophth. Soc. U. Kingdom 30: 56, 1910.

The apparatus herein described (fig. 1) consists of a flat piece of wood 12 inches long, 2½ inches wide, and 5/8 inch thick. At the distal end of this support is a rack 5 inches wide and 6 inches high which is arranged like a picture frame with the upper section of the frame removed so that a standard near-reading card can be inserted or removed with ease. Exactly 4 inches from the reading card is a screen 5 inches wide,

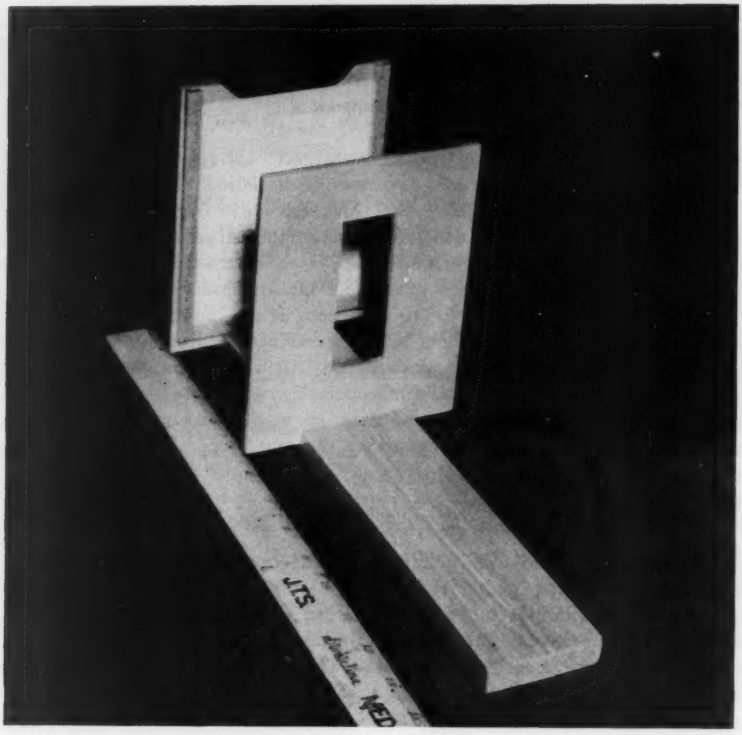

Figure 1. Testing device.

6 inches high, and about 1/4 inch thick, in the exact center of which is a vertical rectangular aperture measuring 3½ by 1¼ inches. The entire apparatus is supported by an appropriate handle.

In using the instrument for testing purposes, the examiner should observe several precautions at all times. The patient being examined may be able to identify the eye with which he is seeing a specific area by noting the slight blur which occurs with a refractive error in one eye. The refractive error, as determined by retinoscopy, should be corrected by lenses in a trial frame worn by the patient during the test if the refractive error is large enough to affect near vision appreciably. If the

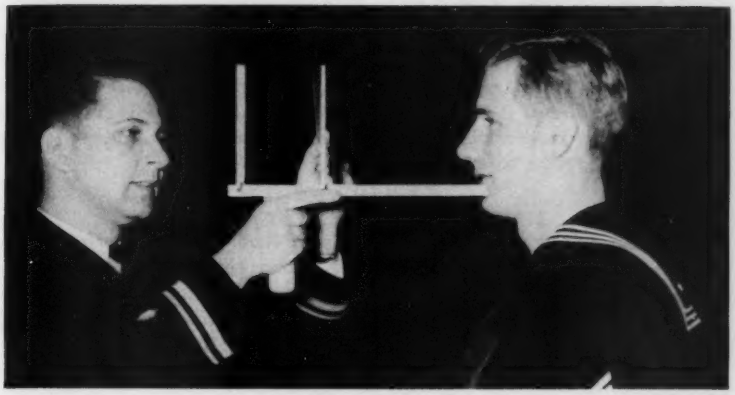

Figure 2. Testing procedure.

patient is presbyopic, the physician can usually make a reasonable estimate of the required addition for near vision on the basis of the age of the patient, and this addition should be included in the trial frame. The examiner stands before the patient, places the proximal end of the apparatus on the chin of the patient, and then observes closely that the patient does not close either eye (fig. 2). If the examinee closes one eye after being instructed not to do so, the examiner should cover the aperture quickly. The test is not entirely invalidated by the momentary closure of one eye because an understanding of the principle of the test does not tell the patient where he should start or stop reading each line. In this case an assistant can record the first or last word read in each line (depending on the eye which is supposedly deficient) and the result should plot a straight vertical line on the reading card if the patient is truthful. It is also possible (though difficult) for the person being examined to keep both eyes open and yet dissociate the eyes so that he may be able to concentrate on the field of vision of only one eye and read accordingly. This is more easily done with the dominant eye, but in either case this offers no particular problem since a period of adjustment is required to accomplish this dissociation as well as a knowledge of what must be done to circumvent the purpose of the test. Lowering of the instrument temporarily will allow fusion to return, and if the examinee is instructed to start reading immediately and moderately rapidly no unusual difficulty will be experienced.

The advantages of this instrument are that: (1) it is most useful in examining patients with questionable monocular amaurosis in which the unaffected eye has normal vision, but it may often be used to advantage in examining patients with monocular amblyopia of moderate degree because a successful test will not only establish the fact that vision is present in both eyes but also give an estimate of the acuity; (2) by the use of a rectangular rather than a square aperture it is possible to show

a full Snellen reading card and to use the varied-size print as the occasion demands; (3) neither excessive accommodation not convergence is required because the card is placed at a convenient reading distance; and (4) the relatively large size of the aperture permits a large binocular field at the center of the card, avoids the confusing physiologic diplopia of the proximal screen when the distal rack is observed, and makes the shift from binocular to monocular perception effortless.

SUMMARY

Measurements are given for a simple and easily constructed apparatus designed to establish the fact that vision exists in both eyes of a patient and to estimate the degree of visual acuity which is present. It is hoped that the instrument will be more widely used to detect malingerers who claim monocular disability, although the examiner must constantly bear in mind the fact that the patient may have true hysteria.

BOOK REVIEW

Lane Medical Lectures: Companionship of Water and Electrolytes in the Organization of Body Fluids, by *James L. Gamble,* Emeritus Professor of Pediatrics, Harvard Medical School. Stanford University Publications, University series, Medical Sciences, Volume V, Number 1. 90 pages; 42 illustrations. Stanford University Press, Stanford, Calif., publisher, 1951. Price $2.50.

The material in this booklet is derived mainly from a series of lectures given by the author over a period of years. In the preface the reader is asked not to regard "these lectures as a review of existing knowledge in this wide field but as an attempt to portray several of the larger features of the body fluids on the basis of current concept." In successive steps he explains the chemical structure of the body fluids and the pathogenesis of acidosis and alkalosis, water and electrolytic balance, processes of dehydration, and methods and rationale of parenteral therapy. The material is presented in a clear, concise manner without the use of highly technical terminology and the booklet is generously illustrated by graphs and charts. Too often parenteral therapy is instituted by physicians who have little knowledge of the physiologic principles involved. A thorough study of this excellent booklet will eliminate many mistakes and serve to put this type of therapy on a more rational basis.—*Col. C. A. Best, MC, U. S. A.*

The Reading Development Laboratory

John Hurley, *Captain, MSC, U. S. A. (1)*

THIS school recognizes its responsibility for assisting students to develop abilities and acquire skills which they are required to possess for the performance of their professional duties. These requirements include the ability to read. One of the best ways of keeping abreast of developments in a profession is by reading. Yet it has been found that, in common with most adults, officers of the Medical Service generally have not developed their reading skills to a degree commensurate with the requirements of their positions. Because of lack of time every reader must restrict his reading to some extent. The poor reader, however, must often restrict his reading to the point where it will cause him to be critically lacking in the necessary information on which he must base decisions.

As an officer is promoted to higher command and staff duties, his reading load of both technical and nontechnical material increases. Proportionately, his reading ability must be increased. Accordingly, in June 1949, this school opened its Reading Development Laboratory. The Reading Development Course at this school consists of 31 hours and is conducted over a 15-week period. The laboratory, proper, is composed of three stations.

Station A contains the tachistoscope bank. At present there are 20 tachistoscopes in the bank. The tachistoscope (fig. 1) is a high precision mechanism with 7 speeds from 1 full second to 0.01 second, for flash exposure of colors, figures, and other stimuli at a desired speed on a screen. This device gives excellent results in rapid recognition programs. The tachistoscope develops concentrated attention; improves visual memory and visual responses; reduces learning time; and increases retention. In addition, it has clinical values for correcting certain visual deficiencies. Here each student is required to spend 15 minutes per class period working with 25 digit slides each 2 inches square. The student begins with the 5-digit series flashed at a speed

(1) Reading Development Laboratory, Medical Field Service School, Fort Sam Houston, Tex.

of 0.04 second, and progresses to speeds of 0.02 and 0.01 second, successively when he has attained a score of 23 out of 25 slides at the indicated speed. He then proceeds to the 6-digit series, and so on.

Station B contains the reading rate controller bank. At present, there are 20 such controllers in the bank. Based on the pacing principle, the controller (fig. 2) is a simple mechanical instrument designed to establish the *maximum* rate at which a person can read the material placed

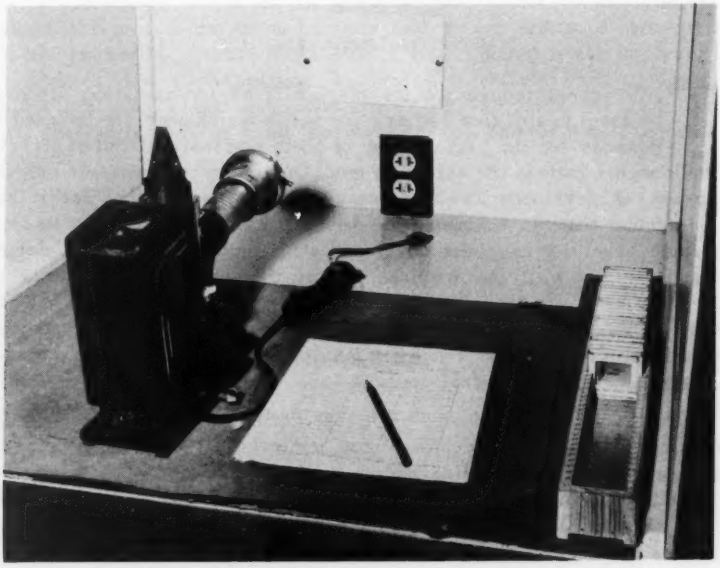

Figure 1. Tachistoscope or flashmeter.

in the instrument and then read other materials on his own at the same rate. It may be used as early as the beginning of the fourth grade of grammar school. Reading material is readily accessible, inasmuch as most books, magazines, and printed materials may be used. The occluding rate may be varied to meet individual differences in rate through a range of from 50 to 2,200 words per minute (e.g., on a 15 cm. page the rate may be varied from 8 through 175 seconds, or from about 50 to 2,200 words per minute in most books).

This instrument is valuable, as a means of forcing the reader to cover the page at a constant rate so that he is stimulated to eliminate undesirable habits in reading. For example, some students are quite easily distracted while reading a book, but when reading on the controller they are less likely to divert their attention. In other words, it acts as a motivating device to increase attention to reading. Further-

more, the speed of the instrument may be increased gradually from day to day so that eventually the reader can achieve the rate he desires, or the rate the teacher plans for him. Some students, who pronounce each word silently while reading, can be induced to speed up their silent reading rates beyond their rates of articulation, thereby establishing a superior habit of thinking meanings rather than saying words from which meaning is derived.

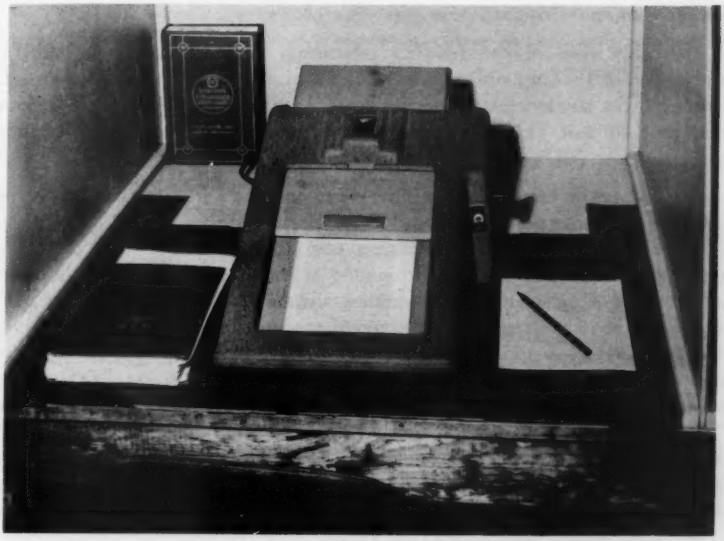

Figure 2. Reading rate controller.

The value of the reading rate controller has been demonstrated at the University of Chicago Reading Clinics where students have increased their rates of reading from 30 to 250 percent without loss of comprehension. These results were obtained where students were carefully selected on the basis of a comprehensive diagnosis which showed their need for the type of instruction which may be provided through the use of this instrument. Here, too, the student spends 15 minutes per class period. From his initial reading rate the student accelerates for the first 11 periods; then a reading comprehension test is given and, depending on his score, the student either continues to accelerate or he slows down, until he has reached his saturation point. From the twelfth period through the twenty-eighth period he continues this "jockeying" until he feels that he has hit his stride. The twenty-ninth, thirtieth, and thirty-first periods are concerned with final comprehension examinations.

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Station C is the group study classroom. It is here that the student receives group tachistoscope work (digit series slides flashed at various speeds), a series of 31 vocabulary checks (20 words per day), a series of spot-check comprehension tests (short-reading selections with 10 questions each), a series of verbalizing exercises where pairs of students work as proctor and student. Both read a lengthy selection. The student then repeats orally what he has just read. The proctor scores the student for comprehension. A series of Iowa State reading tests is also given. Here, also, the students receive the 3 final timed comprehension examinations.

The objective of the reading laboratory is to improve the facility and speed of reading while maintaining a high rate of comprehension. To this end, the student is trained to read faster, to read for better comprehension, to suit his method to his purpose, and to remember what he reads.

Several tests of reading achievement are used in the laboratory. Improved eye-movement patterns are photographed. Pencil and paper tests of speed and comprehension are given to show the degree of change. Some show a gain in speed without loss of comprehension; some show a gain in comprehension without loss of speed; and some show a gain in both speed and comprehension. Each of these gains is of the same kind—a gain in reading facility. A gain in comprehension indicates that the student has focused his attention on "associative spread"; while a gain in speed indicates that he has concentrated on "linear associative association." By either method his reading will have improved. Good readers have less inward vocalization, fewer regressive movements, a wider span of recognition, a quicker fixation time, and a better grasp of the thought patterns that are found in print. They have better general reading skills.

The reading development program at this school is part of an extensive movement. Since World War II, interest in adult reading has increased phenomenally. This interest has by no means been confined to this school, or even to the Armed Services. The remarkable growth of college and business executive training programs in this field proves that this movement has been widespread and general. The results of courses conducted by our Reading Development Laboratory are shown in table 1.

Future plans for reading development courses at this school include the incorporation into group study periods of material in such subjects as leadership, military courtesy, preventive medicine, administration, supply, et cetera. This, it is believed, will be of material assistance to the student in his academic work as well as in increasing his reading rate and comprehension.

A person cannot be successful in any field of reading unless he is able to interpret the printed matter quickly and easily. Serious reading

is often neglected by poor readers because their immature reading habits render such reading too difficult and time consuming. Consequently, they have difficulty in obtaining sufficient information to provide them with a basis for judicious thinking. In many cases such readers understand thoroughly what they read, and their critical reactions to the subject matter are of a high order, but their cumbersome word-by-word reading method places a serious limitation on the choice and amount of their reading. The rapid reader is a phrase-by-phrase reader.

TABLE 1. *Results of reading development courses in 11 classes*

Class	Before training		After training		Gain (percent)	
	Median reading rate (words per minute)	Median comprehension (percent)	Median reading rate (words per minute)	Median comprehension (percent)	Rate	Comprehension
1	273.7	80.48	571.5	82.1	109.0	1.62
2	266.0	71.1	524.0	95.5	96.9	24.4
3	225.8	66.5	515.2	70.9	128.1	4.4
4	234.0	62.14	500.0	72.29	113.7	10.15
5	206.0	51.0	448.0	93.0	117.4	42.0
6	257.0	52.1	524.0	93.9	104.0	41.8
7	250.0	62.0	532.0	94.0	113.0	32.0
8	267.0	76.0	569.0	95.3	113.1	19.3
9	288.0	50.0	609.0	93.0	111.0	43.0
10	340.0	65.2	672.0	91.1	98.0	25.9
11	301.0	83.8	765.0	88.3	154.0	4.5

He concentrates better. He gets a clearer concept of the writer's thought. If he wants details, he quickly sees how they fit into the whole picture. He brings to the printed page a fuller background of information. Because he can read more, the good reader is better informed. He possesses a greater store of material for sound, analytic thinking. He develops good judgment, and over a period of time he achieves greater intellectual stature.

BOOK REVIEW

A Color Atlas of Morphologic Hematology, with a Guide to Clinical Interpretation, by *Geneva A. Daland,* B. S., Chief Laboratory Assistant in Hematology, Thorndike Memorial Laboratory; Research Laboratory Technician, Boston City Hospital. Edited by *Thomas Hale Ham,* M. D., Assistant Professor of Medicine, Harvard Medical School; Associate Director, Thorndike Memorial Laboratory; Junior Visiting Physician, Boston City Hospital. 74 pages; illustrations by *Etta Piotti.* From the Second and Fourth (Harvard) Medical Services and the Thorndike Memorial Laboratory, Boston City Hospital. Harvard University Press, Cambridge, Mass., publishers, 1951. Price $5.

The author briefly discusses the preparation of blood films and discusses the diagnostic limitations of the blood film. Following this, about one-third of the book is given over to the general characteristics of formed elements of blood as stained by Wright's stain and the maturation of the various series of formed elements. Criteria for recognition are given clearly, concisely, and are limited to those that can be applied to the Wright-stained film. Clear diagrammatic tables are used to illustrate maturation showing both marrow and peripheral blood elements as they are present normally and in disease. The author's purpose is not to discuss the various theories of maturation but rather to illustrate diagrammatically and by colored plates the criteria given in the text. This is ably accomplished since the color reproductions leave little to be desired.

The remainder of the book discusses the common anemias, erythroblastosis fetalis, the leukemias, and infectious mononucleosis. The manner of presentation is unique in that actual cases are presented with color plates made as a composite from several blood films in proved cases. Discussion of each condition is brief, to the point, includes clinical discussion, history and follow-up, and a tabulation of the results of significant laboratory tests. The book is a true atlas, well illustrated, with an adequate bibliography and a good index. It should prove to be of value to the laboratory technician and to the hematologist as well as being of interest to the clinician.

—*Col. C. J. Farinacci, MC, U. S. A.*

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